

REQUEST FOR PROPOSAL

For the Design and Construction of the

Public Transportation Facility

For the City of Key West

BID DOCUMENT

RFP No.001-13

AUGUST 2012



Prepared by:



In Collaboration with:



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- A Proposal Checklist
- B Technical Proposal
- C Cost Proposal
- D Bid Bond
- E Contract
- F Performance Bond
- G Payment Bond
- H General Conditions of the Contract (EJCDC)
- I Supplementary Conditions of the Contract
- J Local Vendor Certification Pursuant to CKW Ordinance 09-22 Section 2-798 - **Not Applicable**
- K Indemnification Form
- L Anti-Kickback Affidavit
- M Public Entity Crimes Form
- N Non-Collusion Declaration and Compliance
- O Florida Trench Safety Act Compliance

Appendices

- A Conceptual Drawings
- B Preliminary LEED Checklist
- C Geotechnical Report
- D South Florida Water Management District (SFWMD) Permit
- E Demolition Plans
- F Florida Department of Environmental Protection (FDEP) Site Assessment Plan Approval
- G Asbestos and Lead Paint Assessments
- H Federal Transit Administration (FTA) Governing Documents

1. Project Description

The City of Key West (herein referred to as the CITY) is planning the construction and operation of a Public Transportation Facility (PTF) located on approximately 3.9 acres of land on Stock Island in Key West, Monroe County, Florida. Figure 1-1 represents the Facility site location.

The CITY previously operated the Southernmost Waste-to-Energy Facility as a temporary Class I transfer station on this site, adjacent to the closed Stock Island Landfill. Incinerator and transfer facilities have been removed, and the remaining structures will be demolished to allow full use of the site.

Currently the bus fleet maintenance functions of the CITY are conducted at a small facility on Palm Avenue, where there is no possibility of expansion. The new transportation facility will serve as the transit operations center for the CITY, providing increased operational space and improved security to effectively handle the public transportation requirements of the CITY, now and into the future. The main facilities of the PTF include an Administration Building, Bus Maintenance with six service bays, a Bus Wash, and Fuel Island. These features are described herein.



Figure 1-1 Site

1.1 Project Description

1.1.1 Demolition

The existing Southermost Waste to Energy facility will need to be demolished and closed prior to the construction of the future Key West Transit Facility. There are existing structures to be demolished or salvaged on the site. The City will identify the Demolition and Closure stage as Phase 1. Refer to Section 4 for more information. Design and Construction will be referred to as Phase 2.

1.1.2 Administration Building

The Administration/Operations functions for the Key West Department of Transportation - approximately 7,800 gross square feet - will be housed in a two-story building immediately adjacent to the Bus Maintenance area. Amenities for the employees will include break rooms, toilet rooms, and lockers as well as a training/conference room. Operational amenities include Farebox Receiving and Storage with exterior drop-off functionality. Maintenance offices and a parts room will be located directly off the Bus Maintenance service bays, with toilet/shower/locker rooms for maintenance personnel also accessible directly off the bays.

1.1.3 Bus Maintenance

The Bus Maintenance portion of the structure (approximately 7,500 gsf) will be comprised of a single-story, high-ceilinged shop area and a single-story mechanic support area to the rear. The maintenance functions of the facility will be carried out in the shop area's service and repair bays, with adjacent mechanic support to include a machine shop, electronics shop, and dedicated storage rooms.

1.1.4 Bus Wash

The Bus Wash building (approximately 2,100 gsf) will be constructed as a shell, designed to receive a pre-manufactured, drive-thru, brushless, recirculating, automated wash system. The structure shall be located for convenient access to the fuel island and service bays.

1.1.5 Fuel Island

The Fuel Island will consist of two above-ground tanks (AGT) for storage of bio-diesel fuel, dispensing system, and protective bollards. It should be located to facilitate access for incoming buses and refueling operations.

One of the tanks is owned by the City and shall be relocated and piped by the Design-Builder. The tank is located at 627 Palm Avenue Key West, FL. The Design-Builder shall coordinate the nozzle locations, size, and other associated design/construction considerations with the City prior to design of concrete pad area. The Design-Builder shall furnish and install a second 8,000 gallon tank.

1.1.6 Parking Areas

The PTF will require maintenance line parking near the service bays, as well as space for overnight parking of buses. Wide driveways with generous turning radii, to safely

accommodate the buses, will connect various parts of the site. Parking for employees and maintenance vehicles will also be needed, along with a separate visitor's parking area. In addition, the site will require space to allow incoming and outgoing traffic to enter without backing up onto College Road.

1.1.7 Site Security

The proposed site will require site security consisting of a perimeter fence along the project boundary line and a control operated gate. The fence material shall be, at a minimum, galvanized steel chain link fence. The security fence shall comply with the Key West Code of Ordinances. Please refer to www.municode.com for City of Key West Code of Ordinances.

Public access to employee and maintenance areas must be restricted to maintain a safe environment. Security cameras will be placed in strategic locations throughout the site with monitoring capabilities inside the Administration Building.

Fence gate shall be installed to allow access to landfill perimeter road.

1.1.8 Sustainability

In accordance with F. S. 255.252,

“it shall be the policy of the state that buildings constructed and financed by the state be designed and constructed to comply with the United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) rating system, the Green Building Initiative’s Green Globes rating system, the Florida Green Building Coalition standards, or a nationally recognized, high-performance green building rating system as approved by the department”

and

“All county, municipal, school district, water management district, state university, community college, and Florida state court buildings shall be constructed to meet the United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) rating system, the Green Building Initiative’s Green Globes rating system, the Florida Green Building Coalition standards, or a nationally recognized, high-performance green building rating system as approved by the Department of Management Services. This section shall apply to all county, municipal, school district, water management district, state university, community college, and Florida state court buildings the architectural plans of which are commenced after July 1, 2008.”

This facility will be designed and constructed to qualify for Certification under LEED 2009 for New Construction and Major Renovations. The Design/Builder shall review the preliminary sustainability goals of the project and refer to the LEED Reference Guide for Green Building Design and Construction 2009 Edition (hereinafter referred to as LEED Reference Guide) in order to create and implement a LEED work plan prior to commencement of construction documents. Any discrepancies between the preliminary LEED evaluation, schematic plans, and site conditions that may adversely impact the sustainability goals shall be immediately brought to the attention of the Owner for further discussion and resolution. Activities throughout the design and construction process may directly or indirectly affect the project’s eligibility for Certification and may be implied or expressly defined within this document. It is the responsibility of the Design/Builder to ensure that the Owner’s sustainability/LEED goals are achieved to the Owner’s satisfaction and in accordance with applicable federal and state laws and local ordinances.

1.2 Information and Instructions to Proposers

Project: City of Key West Public Transportation Facility

City Project No. RFP # 001-13

This RFP is issued to provide prospective Proposers with information, guidelines, and rules to prepare and submit a Technical Proposal and Cost Proposal. The submittal must satisfy all criteria established in this RFP to qualify for an award, unless it is waived by the CITY as an informality, technicality, or irregularity, at CITY's sole discretion.

1.2.1 Definitions

"Codes" - Federal, state; county and city regulations governing all building, site and construction practices.

"DESIGN/BUILDER" - A partnership, corporation, or other legal entity that is:

1. Certified under Chapter 489.119 F.S., to engage in contracting through a certified or registered building contractor as the qualifying agent; and,
2. Certified under Chapter 471.023 F.S., to practice or to offer to practice engineering; certified under Chapter 481.219 F.S., to practice or to offer to practice architecture; or certified under Chapter 481.319 F.S., to practice or to offer to practice landscape architecture.

"Design/Build Contract" - A contract with a design/build firm for the design and construction of a public construction project.

"Evaluation Panel" - The CITY will create an Evaluation Panel (EP) consisting of professional members, its staff, and other agencies, as necessary, to evaluate technical and cost proposals.

"CITY" or "OWNER" - City of Key West, Florida.

"Proposer" - The official entity submitting a proposal in response to this RFP (e.g. contractors, consultants, business organizations, firms, or other entities).

"Proposal" - The Proposer's written response to this RFP offering to provide the specified architecture, engineering, design, permitting, construction and/or services. It shall be considered as a formal offer and shall be valid for a period of 90 calendar days from the date that Technical and Cost Proposals are opened. This includes renderings, drawings, project schedules, reports, and any other documents required for submission by the RFP herein.

"RPR" - Resident Project Representative.

"Request For Proposals (RFP)" - A formal written solicitation for sealed proposals to Design/Build the project stated herein, in which technical presentations, qualifications, experience, and cost are among the main selection criteria.

“Public Transportation Facility (PTF)” – Including but not limited to buildings, access and parking, fire protection, fuel island, emergency power generator, onsite stormwater treatment system, rainwater collection system, and all equipment, materials, and systems to complete intent of design criteria attached.

1.2.2 Invitation

This invitation is extended to all qualified individuals or firms, including joint ventures and partnerships that can provide the requirements specified herein. Proposals should be prepared simply and economically, addressing the requirements in a straightforward and concise manner. The requirements presented in this solicitation represent the CITY's anticipated needs.

1.2.3 Reservation of Rights

The issuance of this RFP constitutes only an invitation to present technical and cost proposals. The CITY reserves, holds and may in its sole discretion exercise any or all of the following rights and options with respect to this RFP:

1. Determine if Proposer's Statement of Qualifications satisfactorily meets the criteria established in this RFP;
2. Seek clarification from any DESIGN/BUILDER submitting a proposal;
3. Reject any and all proposal in accordance with Section 1.2.15;
4. Re-advertise, issue, and solicit for other proposals;
5. Cancel this solicitation at any time with or without the substitution of another proposal;
6. Supplement, amend or otherwise modify this proposal; and,
7. Waive any minor irregularity or informality on any matter to the extent not prohibited by law.

The CITY reserves the right to modify the Scope of Work to be considered for this project. The CITY shall have no liability to any Design/Builder Proposer for any costs or expenses incurred in connection with the preparation and submittal of a Proposal in response to this RFP or otherwise.

1.2.4 Pre-submittal Conference

A mandatory Pre-Submittal Conference will be held at the Conference Room of the CITY, located at City Hall: 3140 Flagler Avenue, Key West, Florida, **on September 19th, 2012 at 1:00pm**. A site visit will be scheduled immediately after the conference. The project is very unique due to its location and existing site conditions (e.g. adjacent to a closed land fill). Also, due to grant requirements we want to assure that prospective proposers are aware of all the administrative requirements.

Prospective Proposers are required to attend the Pre-Submittal Conference in person. Any prospective Proposer that does not have representation at the Pre-Submittal Conference shall be considered non-responsive. CITY will not accept or open any proposals from any entity that did not have official representation at the Pre-Submittal Conference.

1.2.5 Questions, Interpretational Addenda

Prospective Proposers shall promptly notify the CITY in writing of all conflicts, errors, ambiguities, inconsistencies, or discrepancies that Proposers find in the Proposal Documents.

No verbal inquiries shall be received or responded to. All questions and clarification inquiries from Proposers concerning the proposals must be submitted in writing either through email, or mail. Any written inquiries must be received by CITY no later than ten (10) calendar days prior to the scheduled date for receipt of proposals. Questions will be answered in writing by the CITY and distributed to all registered RFP holders. See also Section 1.2.18.

Questions should be sent to:

City of Key West
3140 Flagler Avenue
Key West, FL 33040

Attn.: Birchard Ohlinger, P.E.

Phone: (305) 809-3747

Email: bohlinger@keywestcity.com

1.2.6 Availability of Lands for Work

The land is available, and is owned by the CITY, at 5701 College Road, Stock Island, Key West, Monroe County, Florida

1.2.7 Access to Site

On request, the CITY will provide access to the site to allow prospective Proposers to conduct such investigations and tests as may be deemed necessary to submit proposals. Proposers shall schedule such access in advance by contacting

Jay Gewin
Utilities Manager
3140 Flagler Avenue
Key West, Florida 33041
Phone (305) 809-3757

Email: jgewin@keywestcity.com

1.2.8 RFP Documents

This RFP contains the Design/Build Contract, Scope of Services, Demolition, and Design/Build Criteria. No information obtained from any officer, agent or employee of the CITY on any such matter, shall in any way affect the risk or obligation assumed by the successful Proposer, or relieve the Proposer from fulfilling any of the conditions of the Contract.

It is the responsibility of the Proposer to insure that all pages and all addenda are received. All Proposers are advised to closely examine this package. Any questions regarding the

completeness of this package and any addenda thereto should be immediately directed to the CITY contact.

The CITY assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of RFP Documentation. CITY, in making copies of the RFP Documentation available on the above term, does so only for the purpose of obtaining Proposals for the Work to be performed and does not confer a license or grant for any other use.

1.2.9 Examination of Contract Documents and Site

Proposers must satisfy themselves by personal examination of the location of the proposed Work and by thorough examination of the Design Criteria and other related information identified in the Proposal Documents, all requirements of the Work to be performed; and shall not at any time after the submission of a proposal dispute or complain of such estimate or the nature or the amount of Work to be completed. Proposers shall be familiar with, and all work shall comply with, all federal, state and local laws, ordinances, codes, rules and regulations that in any way affect the cost, progress or performance of the Work. Failure on the part of Proposers to thoroughly familiarize themselves with applicable laws, ordinances, codes, rules and regulations will in no way relieve them from the responsibility included in the applicable laws, ordinances, codes, rules and regulations.

Proposers shall be responsible for having investigated to their satisfaction, prior to the submission of proposals, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater and subsurface conditions, the character of equipment and facilities needed preliminary to and during the execution of the Work, the general and local site conditions, any ongoing activities in the project area, and all other matters that can in any way affect the cost, progress, performance, or furnishing of any part of the Work. The price established for the Work will reflect all costs pertaining thereto.

The CITY has obtained a preliminary geotechnical investigation of the site *for informational purposes only* (Appendix C). This shall in no way negate the Proposer's responsibility to perform/obtain a detailed geotechnical investigation and have a Geotechnical Report prepared by a licensed professional, which will serve as the basis of foundation and building design during the design phase of the project.

By submission of a proposal, the Proposer affirms that:

1. He/she has read and understands the RFP Documents, inclusive of the Design/Build Contract and all design criteria, and the Proposals submitted are made in accordance therewith; and,
2. The Proposer has visited the site and familiarized himself/herself with the local conditions under which the work is to be performed; and,
3. At the Proposer's own expense performed all examinations, investigations, explorations, tests, or studies and obtained all additional information and data which pertain to the physical conditions (e.g., surface, subsurface and underground utilities) at or contiguous to the site or otherwise, that may affect the cost, progress

- or performance of the Work and that the Proposer deems necessary to determine his/her cost to perform the Work in accordance with the terms and conditions of the Contract Documents; and,
4. That Proposer has satisfied himself/herself with respect to such conditions and shall make no claims against the CITY if on carrying out the Work he/she finds that the actual conditions do not conform to those indicated.

The submission of proposals will constitute an incontrovertible representation that the Proposer has complied with every requirement of the Instructions to Proposers, that without exception the proposals are premised upon performing the Work required by the Contract Documents and such means, methods, techniques, sequences, or procedures of design and construction as may be indicated in or required by the Contract Documents are sufficient; in scope and detail to indicate and convey an understanding of all terms and conditions for performance of the Work.

Proposers shall not be entitled to any additional compensation or time extensions based upon alleged differing conditions that in the opinion of the CITY shall have been reasonably anticipated at the time of preparation of the proposals.

1.2.10 Interpretations and Addenda

Proposers shall carefully examine the Request for Proposal documents. Any ambiguities or inconsistencies shall be brought to the attention of the CITY in writing prior to the submittal deadline as stated in Section 0. Failure to do so on the part of the Proposer will constitute an acceptance by the Proposer of any subsequent decision.

Any written questions, however, shall not involve the quality or use of products or methods; the CITY will neither approve nor disapprove particular proposed substitute products prior to the receipt of Technical Proposals. Such products may only be considered when offered by the Proposer for incorporation into the Work after award of the Contract.

In general, no answer will be given to prospective Proposers in reply to an oral question if the question involves an interpretation of the intent or meaning of the Contract Documents, or the equality or use of products or methods other than those designated or described in the Contract documents. Any information given other than by means of the Contract Documents, including Addenda as described below, is given informally for informational purposes and for the convenience of the Proposers only and is not guaranteed. The Proposer agrees that such information, interpretations, corrections, or changes will not be binding and shall not be used as the basis of, nor shall the giving of any such information entitle the Proposer to assert, any claim or demand against the CITY on account thereof.

When solicitation revisions are deemed advisable or become necessary, including changes to the deadline for proposal submission, they shall be answered only in the form of written addenda posted on Demand Star. Please contact Demand Star at www.demandstar.com or call 1-800-711-1712 to obtain addenda. All addenda so issued shall become a part of the Contract Documents.

All addenda issued must be acknowledged. Prospective Proposers are advised to contact the CITY prior to the solicitation deadline to ascertain the existence and number of any

addenda issued. Failure of any Proposer to receive or to acknowledge receipt of any addenda shall not relieve such Proposer from any terms, conditions and obligations under its proposal as submitted.

No addenda will be issued less than five (5) working days prior to the date for receipt of proposals; except an addendum withdrawing the Request for Proposals, or one which includes a postponement of the date for receipt of proposals.

Prior to submission of its proposal, the Proposer shall ascertain that it has received all addenda issued. The Proposer shall acknowledge receipt in writing of each individual addendum by completing the acknowledgment included in the Cost Proposal Form.

1.2.11 Preparation and Submission of Proposals

Technical Proposals and Cost Proposals must be submitted in separately sealed envelopes or boxes by the deadline indicated in this solicitation. The outside of the sealed envelopes or boxes shall be marked "SEALED PROPOSAL"; identified by the name of the Proposer; project name; RFP number; and the Proposer's return address. One envelope will be labeled "Cost Proposal" and the other envelope shall be labeled "Technical Proposal." The CITY assumes no responsibility for proposals not properly marked.

Four (4) copies of each proposal shall be submitted (one marked "original" and three copies), and 2 CD-ROM or flash drives, each shall contain one PDF file each of the full response.

Failure to comply with these requirements may be considered grounds for declaring the submittal non responsive.

The Proposer shall provide the information requested in the proposal documents. All proposals must be in legible/readable format in computer form, typewritten or executed in ink. All documents requiring execution by an officer or employee having authority to bind the company or firm must be executed in ink. Signatures shall be required as follows:

1. Proposals by a corporation must be manually executed in the corporate name by the President or Vice President (or other corporate officer, accompanied by written evidence of binding signatory authority). The corporate seal must be affixed and attested by the Corporate Secretary or Assistant Corporate Secretary.
2. Proposals by a partnership must be manually executed in the partnership name and signed by a partner whose title must appear under the signature. The official address of the partnership must be shown below the signature.
3. Attorneys-in-Fact who sign bonds or other surety instruments must attach with each bond or surety instrument a certified and effectively dated copy of their power of attorney.

Please respond concisely to each of the requirements or questions as set forth in the proposal documents. Each requirement or question shall be responded to separately, with the requirement or question preceding each response. Proposals shall be on 8.5" x 11" format included in a loose-leaf binder with section dividers as required further herein. All proposals must include the provided forms. Proposals on Contractor letterhead; or

quotation forms will not be accepted. Proposals submitted by facsimile transmission shall not be accepted.

The proper delivery of the proposal to the CITY is solely and strictly the Proposer's responsibility. The CITY cautions Proposers to assure actual delivery of proposals either hand-delivered or mailed via U.S. mail or overnight courier, directly to the CITY prior to the deadline set for opening proposals. The CITY shall not be responsible for delays, caused by the United States Postal Service, other delivery companies or services, or any other occurrence. Proposals submitted by certified or registered mail, not received by CITY at the time of the Proposal Opening will not be honored.

Receipt of a proposal by any CITY office, receptionist, or personnel other than CITY CLERK does not constitute "delivery" as required by this solicitation.

The proposal delivery time will be scrupulously observed. Under no circumstances will proposals delivered after the specified delivery time be considered. Late proposals will be returned to the Proposer unopened with the notation: "This proposal was received after the delivery time designated for the receipt of proposals."

1.2.12 Withdrawal of Proposal

Proposers may withdraw their submitted proposal by notifying the CITY via telegraphic or written communication at any time prior to the proposal submittal deadline. The written request must be signed in a manner identical with the proposal being withdrawn and be worded so as not to reveal the amount of the Cost Proposal.

If within twenty-four hours after Cost Proposals are opened a Proposer files a signed written notice with the CITY and promptly thereafter demonstrates to the reasonable satisfaction of the CITY that there was a material and substantial mistake in the preparation of its price, the Proposer may withdraw its Cost Proposal. The Proposer's Proposal Security will then be returned within thirty (30) days thereafter.

1.2.13 Modifications of Proposals

Proposers may not modify their proposals after the date(s) and time(s) designated for the receipt of proposals.

Proposers may modify a proposal already submitted by delivering a telegraphic or written communication to the place where proposals are to be submitted at any time prior to the proposal submittal deadline. The written request for modification must be duly executed and signed in a manner identical with the proposal being modified and be worded so as not to reveal the amount of the original Cost Proposal. It shall however, state the addition, subtraction or other modification to the Cost Proposal, such that the Price will not be known until the sealed Cost Proposal is opened. No modifications will be permitted after the date and time designated for the receipt of Cost Proposals.

1.2.14 Unauthorized Deviations and Alternative Proposals

Proposers are hereby advised that the CITY will only consider proposals that fulfill the obligations and requirements imposed upon them by this RFP. Unauthorized conditions, exceptions, limitations or provisions attached to a Cost Proposal may cause its rejection as

being non-responsive. The completed forms provided herein shall be without interlineations, alterations or erasures in the printed text. Alternative proposals will not be considered unless requested. Oral or telephonic proposals or such modifications to proposals submitted will not be considered.

Nothing contained herein shall place a duty upon the CITY to reject proposals or award a contract based upon anything other than its sole discretion as described herein.

1.2.15 Acceptance/Rejection of Proposals

Selection shall be in accordance with F.S. 287.055. The CITY may reject bids for any and/or all of the following reasons:

1. For budgetary reasons,
2. If the bidder misstates or conceals a material fact in its bid,
3. If the bid does not strictly conform to the law or is non-responsive to the bid requirements,
4. If the bid is conditional, or
5. If a change of circumstances occurs making the purpose of the bid unnecessary to the CITY.

The CITY further reserves the right to reject the proposal of any Proposer that previously failed in the proper performance of an award, or to deliver on time a contract of a similar nature, or who has been suspended or debarred from doing business with the CITY, or who is not in a position to perform properly under this award. The CITY reserves the right to inspect all facilities of Proposers in order to make a determination as to the foregoing.

Reasonable efforts will be made to either award the Contract or reject all bids within one-hundred twenty (120) calendar days after bid opening date. A Bidder may not withdraw its bid unilaterally nor change the Contract Price before the expiration of one-hundred twenty (120) calendar days from the date of bid opening. A Bidder may withdraw its bid after the expiration of one-hundred twenty (120) calendar days from the date of bid opening by delivering written notice of withdrawal to the City Clerk prior to award of the Contract by the City Commission.

More than one proposal from an individual, firm, partnership, joint venture, corporation, or association under the same or different names will not be considered. If the CITY believes that any Proposer is included in more than one proposal, all proposals in which such Proposer has an interest will be rejected. If the CITY believes that collusion exists amongst the Proposers, all such collusive proposals will be rejected.

Any blank spaces on the Cost Proposal form, qualifying notes, exceptions, counter offers, lack of required submittals, signatures, or failure to submit on the CITY Cost Proposal form may cause the proposal to be declared non-responsive.

The CITY reserves the right to award to that Proposer which, in the opinion of the CITY, will be in the best interest of and/or the most advantageous to the CITY. Minor irregularities, informalities and technicalities in a proposal may be waived by the CITY. A

minor irregularity or informality is a variation from the solicitation that does not affect the Cost Proposal or does not give a Proposer an advantage or benefit not enjoyed by other Proposers, and does not adversely impact the interests of the CITY.

1.2.16 Development Costs

Neither the CITY nor its representatives shall be liable for any expenses incurred in connection with the preparation, submission, or presentation of a proposal to this solicitation. All information in the proposal shall be provided at no cost to the CITY.

1.2.17 Disclosure

Upon receipt, sealed bids or proposals are exempt from public disclosure until such time as the CITY provides notice of a decision or intended decision or within 10 days after bid or proposal opening, whichever is earlier. Thereafter, all proposals become "public records" and shall be subject to public disclosure consistent with Chapter 119, Florida Statutes. Proposers claiming exemptions to disclosure provided by law must provide at the time of the proposal submittal the specific statutory authority for the claimed exemption, identifying the specific data or other materials to be protected, and stating the reasons why such exclusion from public disclosure is necessary. Unless exemption is established, proposals will thereafter be made available for public inspection at the Office of the CITY.

Proposers shall disclose all material facts with its proposal submission pertaining to any felony conviction or any pending felony charges in the last three years anywhere in the United States against:

1. Proposer;
2. Any business entity related to or affiliated with Proposer; or,
3. Any present or former executive employee, officer, director, stockholder, partner or CITY of Proposer or of any such related or affiliated entity.

This disclosure shall not apply to any person or entity that is a stockholder owning less than 20% of the outstanding shares of a Proposer whose stock is publicly owned and traded.

Proposer shall also disclose any civil conviction or pending civil litigation involving contract performance during the last three years anywhere in the United States against the Proposer or any business controlled by or affiliated with Proposer.

The CITY may reject, at its sole discretion, any Proposer it finds to lack honesty, integrity or moral responsibility, or whose present or former executive employees, officers, directors, stockholders, or partners are found to lack honesty, integrity or moral responsibility. The CITY's finding may be based on the disclosure required herein, the CITY's own investigation, public records, or any other reliable source of information. The CITY may also reject any Proposer failing to make the disclosure required herein. By submitting a proposal, Proposer recognizes and accepts that the CITY may reject any proposal at its sole discretion. The Proposer waives any claim it might have for damages or other relief arising from the rejection of its proposal, or resulting directly or indirectly from the rejection of its proposal based on these grounds, or from the disclosure of any pertinent information relating to the

reasons for rejection of its proposal. Please also see F.S. Section 287.133 referenced in Section 1.2.29 of this document.

1.2.18 Award and Execution of Contract

Proposers acknowledge that this solicitation or the proposal does not constitute a contract with the CITY. No contract is binding or official until the CITY and its funding agents approve a contract. The CITY intends to enter into contract agreements with one Proposer, based on the selected proposal and the agreements attached to the RFP.

Where applicable, discrepancies shall be resolved as follows:

1. Discrepancies between prices written in words and prices written in numbers will be resolved in favor of prices written in words.
2. Where proposals have erasures or corrections, each erasure or correction must be in ink and initialed in ink by the Proposer.

The CITY may conduct such investigations as it deems necessary to assist in the evaluation of any proposal and to establish the responsibility, qualifications and financial ability of the Proposers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents.

The Proposer to whom the award is made shall, within fifteen (15) calendar days, not including Sundays, and legal holidays, after receiving notice of award, provide evidence of any required insurance, performance bonds, payment bonds and guarantee, and schedule of subcontractors (if applicable) and if determined applicable by the CITY negotiate any remaining items for consideration in the contract documents. Failure to execute the contract and/or to provide evidence of any required insurance or bonding coverage shall be just cause for annulment of the award. Award may then be made to the next highest ranked Proposer, or the Work may be re-advertised, at the CITY's discretion.

If within fifteen (15) calendar days, not including Sundays and legal holidays, after issuance of Notice of Contract Award, the successful Proposer refuses or otherwise neglects to execute the required written contract and fails to furnish the required Performance Bond and Payment Bond, the amount of the Proposer's Proposal Security shall be forfeited and the same shall be retained by the CITY.

No plea of mistake in the proposal or misunderstanding of the conditions of forfeiture shall be available to the Proposer for the recovery of its proposal security or as a defense to any action.

The ability of a Proposer to obtain a Performance Bond and a Payment Bond shall not be regarded as the sole test of such Proposer's competency or responsibility.

1.2.19 Tax Exempt Status

The CITY is a political subdivision of the state of Florida. The CITY is the governing authority and, as such, is exempt from paying sales and use taxes imposed by the state, and federal and state taxes for tangible personal property. Proposers must note that they will be responsible for the payment of all taxes and that the costs thereof are included in the prices stated in the Cost Proposal.

1.2.20 Laws, Codes, and Regulations

Proposers are notified that all applicable federal and state laws, municipal and County ordinances, and the rules, regulations, resolutions, policies, and procedures of the CITY, and any other authority having jurisdiction over any part of the project shall apply to the solicitation and the contract throughout, and are deemed to be included in this solicitation/contract the same as though herein written.

If any discrepancy or inconsistency shall be discovered between the Request for Proposal and any law, code, ordinance, regulation, order of decree, Proposer shall immediately report the same in writing to the CITY who will issue such instructions as may be necessary. However, it shall not be grounds for a Change Order that the Proposer was unaware of or failed to investigate the rules, codes, regulations, statutes, and ordinances of all applicable governmental agencies having jurisdiction over the Project or the work.

Whenever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards or codes current on the effective date of this solicitation shall apply, unless otherwise expressly set forth. Unless otherwise specified, reference to such standards or codes is solely for implementation of the technical portions of such standards and codes. In case of conflict among or between any referenced standards and codes the CITY will determine which shall govern. Proposer acknowledges that compliance with code requirements represents minimum standards for construction and is not evidence that the work has been completed-in accordance with the Contract Documents.

The contractor must strictly comply with federal, state, and local building and safety codes, Americans with Disabilities Act, and Florida Accessibility Code. All Florida Accessibility Code requirements are not expressed in the text of specific design criteria. The Design/Builder is responsible for design of spaces and appurtenances, including, but not limited to, shelves, handles, counters, sinks, cabinets and toilet facilities, per the Florida Accessibility Code.

Proposer certifies that all material, equipment, processes, etc., contained in its proposal meet all OSHA, ANSI, NFPA and all other federal and state requirements. Equipment must meet state and federal safety regulations for grounding of electrical equipment and for lock-out/tag-out procedures. Proposer further certifies that if it is the successful Proposer and the materials, equipment, etc., delivered are subsequently found to be deficient in any of the aforementioned requirements in effect on the date of delivery, all costs necessary to bring the materials, equipment, processes, etc., into compliance shall be borne by the Proposer.

1.2.21 Conflict of Interest

All Proposers must disclose with their Technical Proposal the name of any officer, director, or agent who is also an employee of the CITY. Further, all Proposers must disclose the name of any CITY employee who owns, directly or indirectly, an interest in the Proposer's firm or any of its branches.

1.2.22 Certifications, Licensing, and Permit Requirements

To be considered for contract award, Proposers and their subcontractors shall be licensed, certified and registered by all applicable federal, state, regional, county or municipal agencies having jurisdiction over the specified work. Proposers shall supply license numbers, with expiration dates, as part of their proposal. Failure to hold and provide proof of proper licensing, certification, and registration may be considered grounds for rejection of the proposal. The Proposer must include a copy of all applicable Certificates of Competency issued by the state of Florida, Monroe County and City of Key West.

The Proposer shall secure all permits required to complete the work at no additional cost to the CITY. Failure to secure permits prior to commencement of work will be considered a default under the Contract. Non-residents regulated by the Florida Department of Professional Regulation may submit a copy of their Florida Department of Professional Regulation License and a current Occupational License issued by the County or City where their business is located.

Subcontractors shall be licensed in their respective fields to obtain permits. Said license must be in the name of the subcontractor.

1.2.23 Qualifications of Surety Companies

In order to be acceptable to the CITY, the surety company issuing the Performance Bond and Payment Bond shall meet and comply with the following minimum standards:

1. Surety must be authorized to do business in Florida and shall comply with the provisions of Florida Statute 255.05.
2. During all construction, guarantee and warranty periods the Surety must be listed on the U.S. Department of Treasury Fiscal Service, Bureau of Government Financial Operations, Federal Register, Part V, latest revision, entitled: "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies."
3. All bonds shall be originals and issued or countersigned by a local producing agent who is a resident of the state of Florida with satisfactory evidence of the authority of the person or persons executing such bond shall be submitted with the bond. Attorneys-in-Fact who sign bonds or other surety instruments must attach with each bond or surety instrument a certified and effectively dated copy of their power of attorney. Agents of surety companies must list their name, address and telephone number on all bonds.
4. The life of the bonds shall extend twelve (12) months beyond the date of Final Completion and shall contain a waiver of alteration to the terms of the Contract, extensions of time and/or forbearance on the part of the CITY.

1.2.24 Proposal Security

The Cost Proposal shall be accompanied by a certified check, cashier's check or Proposal Bond (i.e., Bid Bond) in an amount not less than five percent (5%) of the Total Proposed Price. Said check or bond shall be made payable to the City of Key West and shall be given as a guarantee that the successful Proposer, upon receipt of notification of award, will enter into an Agreement and furnish the required Payment and Performance Bonds. In case of refusal or failure to enter into said Agreement, the check or Proposal Bond, as the case may be, shall be forfeited to the CITY as liquidated damages. Failure to submit the Proposal Security with the Cost Proposal may be grounds for rejection of the proposal. All bonds shall be written by a Surety Company of recognized standing, authorized to conduct business in the state of Florida; and shall have a registered agent in the state of Florida.

The CITY shall have the right to retain the Proposal Security of Proposers to whom an award is being considered until either:

1. The Contract has been executed and bonds have been furnished; or,
2. The selected Proposer withdraws its proposals without the consent or approval of the CITY or,
3. All proposals have been rejected.

The successful Proposer must provide a Letter of Commitment from a state of Florida licensed bonding company to provide a Performance Bond and a Payment Bond. The Letter of Commitment must specifically accept the Performance Bond and Payment Bond language stipulated in this proposal. In addition, it must acknowledge that the Performance Bond and Payment Bond each will be supplied for the dollar amount stated herein.

1.2.25 Performance Bond and Payment Bond

A Performance Bond and a Payment Bond issued in a sum equal to one hundred percent (100%) of the total awarded contract amount (including design and construction) will be required from the successful Proposer for purposes of protecting the CITY from lawsuits for:

1. Non-payment of debts as might be incurred during the Proposer's performance under the contract; and,
2. Ensuring the faithful performance of the obligations imposed by the contract.

The Performance Bond and a Payment Bond forms are included in the Contract Documents and these forms must be properly executed by the Surety and the successful Proposer within fifteen (15) calendar days, not including Sundays and legal holidays, after receipt of notification from the CITY of its award of the contract.

1.2.26 Trench Safety Act

Pursuant to Chapter 90-96 (CS/SB 2626), Laws of Florida, "Trench Safety Act", any person submitting a proposal is required to complete the form entitled: COMPLIANCE WITH FLORIDA TRENCH SAFETY ACT (90-96 LAWS OF FLORIDA) and return the form with the Cost Proposal Form (Attachment O).

This is not a pay item. The purpose of the form is to gather information on the costs associated, with trench safety measures and to insure that the Proposer has considered these costs and included them in the proposal. Failure to complete this form may result in the proposal being declared non-responsive.

1.2.27 Occupational Safety and Health Act (OSHA)

Proposer must comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91956), under Section 107 of the Contract Work Hours and Safety Standards Act (PL 9154), and otherwise as required by law. In instances where such is applicable due to the nature of the proposal matter with which this proposal package is concerned, all material, equipment, etc., as proposed and offered by Proposer must meet and conform to all OSHA requirements. The Proposer's signature upon the Cost Proposal form, being by this reference considered a certification of such fact.

1.2.28 Compliance with the Florida Toxic Substance Statute

In compliance with Chapter 442, Florida Statutes, any toxic substance required by this solicitation and delivered to the project must be accompanied by a Material Safety Data Sheet (MSDS). The MSDS must include the following information:

1. The identity used on the chemical product's label.
2. The chemical and the common names of all ingredients that have been determined to be a health hazard.
3. Physical and chemical characteristics of the hazardous chemicals (i.e., vapor pressure, flash point).
4. The physical hazards of the hazardous chemical including the potential for fire, explosion and reactivity.
5. The health hazards of the hazardous chemical, including signs and symptom of exposure.
6. Primary routes of entry.
7. The Occupational Safety and Health Administration (OSHA) permissible exposure limit, American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value, and any other exposure limit used or recommended.
8. Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen.
9. Any generally applicable precautions for safe handling and use that are known.
10. Any generally applicable control measures that are known (e.g., ventilation point source controls, etc.).
11. Emergency and First Aid procedures.
12. The date of MSDS preparation or the last change to it.
13. The name, address, and telephone number of the chemical manufacturer or importer.
14. Any recommended personal protective equipment (i.e. gloves, goggles, respirators, etc).

1.2.29 Public Entity Crimes Statement (F.S. 287.133)

As provided in Florida Statute 287.132-133, by submitting a proposal, or entering into a contract, or performing any work in furtherance thereof, the Proposer certifies that it, its affiliates, suppliers, subcontractors and consultants who will perform hereunder, have not been placed on the convicted vendor list maintained by the state of Florida Department of Management Services within the 36 months immediately preceding the date hereof. This notice is required by Florida Statute 287.133 (3) (a). This certification shall be included as part of Package No. 1 Technical Proposal. See Attachment M.

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of \$25,000.00 for a period of 36 months from the date of being placed on the convicted vendor list.

The Proposer further understands and accepts that any contract issued as a result of this solicitation shall be either voided or subject to immediate termination by the CITY, in the event there is any misrepresentation or lack of compliance with the mandates of Section 287.133, Florida Statutes. The CITY, in the event of such termination, shall not incur any liability to the Proposer for any work or materials furnished.

1.2.30 Subcontractor and Supplier Information

Proposers shall list proposed major subcontractors and suppliers to be used, to include name, mailing address, phone number, fax number, web-site address (if available), e-mail address (if available), type of work subcontracted, and dollar amount of work. The Proposer shall provide an experience statement with pertinent information regarding similar projects and other evidence of qualification for each subcontractor, supplier, person or organization. If after due investigation the CITY has reasonable objection to any proposed subcontractor, supplier, person or organization, the CITY may, before Notice of Award, request the successful Proposer to submit an acceptable substitute. The CITY reserves the right to make a determination as to the foregoing.

If the apparent successful Proposer declines to make any such substitution, the CITY may award the Contract to the next highest ranking Proposer that proposes to use subcontractors, suppliers and other persons and organizations acceptable to the CITY. Failure to make requested substitutions does not constitute grounds for forfeiting the Proposal Security of any Proposer. Any subcontractor, supplier, other person or organization listed and to whom the CITY does not make a written objection prior to issuing the Notice of Award will be deemed acceptable to the CITY, subject to revocation. No acceptance by the CITY of any such subcontractor, supplier or other person or organization shall constitute a waiver of any right of the CITY to reject defective Work, materials or equipment not conforming to the Contract Documents.

Proposer shall not change any subcontractors without just cause and approval by the CITY. No Proposer shall be required to employ any subcontractor supplier, other person or organization against whom the Proposer has a reasonable objection.

1.2.31 Contract Time

The number of successive calendar days within which, or the date by which, the Work is to be substantially completed and also completed and ready for final payment and acceptance by the CITY are set forth in the Design/Build contract.

Time is of the essence for the Contract. The successful Proposer shall commence the work to be performed under the Contract Documents on the date set by the CITY in the written Notice to Proceed, and shall continue the work with due diligence and shall agree to complete the entire work as identified in the Technical Proposal and the Design Criteria Package.

1.2.32 Liquidated Damages

Liquidated damages, in the amount and in accordance with the terms stated in the Agreement, shall be paid by the Proposer for each day from the time specified for the completion of the Contract until final acceptance of the Work in accordance with the Agreement. This is estimated as fixed damages to the CITY for failure to complete the Work in the time specified. This charge shall be made, unless the CITY shall grant an extension of time for the completion of the Work.

1.2.33 Insurance

The successful Proposer shall, at its sole expense, provide and maintain in full force and effect throughout the term of the Contract, all insurance coverage as set forth in the Supplementary Conditions (Attachment I) and with insurers and under forms of policies acceptable to the CITY. Evidence of appropriate insurance coverage shall be provided as an attachment to the Cost Proposal. Proposers may fulfill this requirement by having their insurance agent either:

1. Complete and sign an insurance certificate which meets all of the requirements as provided in this RFP; or,
2. Issue a letter on the insurance agency's stationery stating the Proposer qualifies for the required insurance coverage levels and that an insurance certificate will be submitted before final execution or issuance of the contract.

All insurers must be qualified to lawfully conduct business in the state of Florida. Failure of the CITY to notify the Proposer that the certificate of insurance provided does not meet the contract requirements shall not constitute a waiver of the Proposer's responsibility to meet the stated requirements. In addition, receipt and acceptance of the certificate of insurance shall not constitute approval of the amounts or types of coverage listed on the certificate. The successful Proposer shall provide evidence certifying that all insurance is in full force and effect; and such evidence shall include provisions that the insurance shall not be canceled, expire or be materially changed without giving the CITY at least thirty (30) days advance notice by registered mail.

Misrepresentation of any material fact, whether intentional or not, regarding the Proposer's insurance coverage, policies or capabilities, may be grounds for rejection of the proposal and rescinding of any ensuing contract.

1.2.34 Non-discrimination Clause

It is the express policy of the CITY that the CITY shall not conduct business with nor appropriate any funds for any organization that practices discrimination on the basis of race, color, national origin, religion, ancestry, gender, age, marital status, sexual orientation or disability.

1.2.35 Limitation of Liability

Any legal action to recover monetary damages in tort for injury or loss of property, personal injury, or death caused by the alleged negligent or wrongful act or omission of any employee of the CITY acting within the scope of his/her office or employment is subject to the limitations specified in Florida Statute 768.28.

No officer, employee or agent of the CITY acting within the scope of his/her employment or function shall be held personally liable in tort or named as a defendant in any action for any damage suffered as a result of any act, event, or failure to act.

The CITY shall not be liable in tort for the acts or omissions of an officer, employee, or agent committed while acting outside the course and scope of his/her employment. This exclusion includes actions committed in bad faith or with malicious purpose, or in a manner exhibiting wanton and willful disregard of human rights, safety, or property.

1.2.36 Contract with Third-Parties

The Proposer shall not enter into any contractual agreement with a third party for performance of any conditions under this RFP without the express written approval of the CITY.

1.2.37 Assignment

The Proposer's proposal, if accepted, resultant contract, and any permits required for performance of the Contract shall not be assigned, conveyed, or otherwise disposed of without permission of the City Commission by Resolution.

1.2.38 Minority, Women Business Enterprises or Disadvantaged Business Enterprises

Design/Build Proposers are hereby informed that the CITY encourages the utilization and participation of Minority, Women Business Enterprises or Disadvantaged Business Enterprises. Proposers are encouraged to seek Minority, Women Business Enterprises or Disadvantaged Business Enterprises for participation in subcontracting opportunities. Please refer to Appendix H, Item No. 28.

1.2.39 Local Vendor Preference

This section does not apply on this project.

1.2.40 Domestic Partner Benefits

Except where otherwise exempt or prohibited by law, a contractor awarded a contract pursuant to a bid process shall provide benefits to domestic partners of its employees on the basis as it provides benefits to employee spouses.

Such certification shall be in writing and shall be signed by an authorized officer of the contractor and delivered, along with a description of the contractor's employee benefits plan, to the City's procurement director prior to entering a contract.

If the contractor fails to comply with this section, the City may terminate the contract and all monies due or to become the contract may be retained by the City.

1.3 Proposal Checklist

Attachment A provides a proposal checklist.

1.4 Technical Proposal

Attachment B provides the technical proposal forms to be completed by the Proposer.

1.5 Cost Proposal

Attachment C provides the cost proposal forms to be completed by the Proposer.

1.6 Evaluation Criteria

The CITY will convene an Evaluation Panel to conduct a review and ranking of Technical Proposals and Cost Proposals submitted in response to the Design/Build Request for Proposal. The Evaluation Panel will consist of designated CITY staff and/or selected representatives of the CITY. The Evaluation Panel may be assisted by the following non-panel individuals:

1. Reference Verifier - contacts and verifies references listed in the Statement of Qualifications and reports to the Evaluation Panel on findings on fact.
2. Financial and Surety Advisor(s) - reports to the Evaluation Panel on the sufficiency and quality of financial information and creditworthiness, as well as bonding and insurance documentation submitted with a Technical Proposal or Cost Proposal.
3. Contact Person - serves as an information conduit between CITY staff, the Proposers and the Evaluation Panel.
4. Legal Consultant - advises the Evaluation Panel on questions of law that may arise and ensures that the Panel, its members, and the actions and decisions of the panel do not violate existing law or CITY rules, regulations, policies and procedures.

Evaluation of the Technical Proposal which includes qualifications and experience, and the Cost Proposal from each Proposer shall be based on evaluation criteria and procedures established within this document. The Evaluation Panel shall evaluate and score the two parts of the proposal from each Proposer and establish the final ranking of submittals received.

1.6.1 Technical Presentation and Cost Proposal Presentation

The two parts of the Proposal and required attachments shall be submitted to the CITY on or before the due date stated in the RFP solicitation. The Proposer must identify any portions of the submittal that are proprietary. The contact person will review the submittals and make provisions for withholding proprietary documents from public record.

Each member of the Evaluation Panel will receive a packet containing the Technical Proposal of each Proposer. The Evaluation Panel will review and score the Technical Proposals according to the scoring criteria which follows. The Proposer shall ensure that the required elements of the similar project descriptions and personnel experience are adequately explained in the text with emphasis on how the particular element was performed in conjunction with the overall project. The mere listing of elements without specific details in the body of the description will negatively impact the scoring for the project.

1.6.2 Evaluation Panel Process

The Evaluation Panel is subject to the state law and CITY rules and regulations. Florida Statute Section 286-011 ("Government in Sunshine Law") requires that any meeting (including telephone conversations) between two or more members of a public board or commission, for the purpose of discussing any matter on which foreseeable action may be taken by the board or commission, must be publicly noticed and open to attendance by the general public.

Meetings of the Evaluation Panel shall be as follows:

- Initial Orientation Meeting: Panel members will receive a copy of each Technical Proposal. The panel will select a Chairman. The Reference Verifier, Contact Person and Financial/Security Adviser will be introduced and their individual responsibilities reviewed with the Panel.

After the initial meeting, each Panel member will independently review the Technical Proposals for scoring in accordance with the established evaluation criteria. Questions or comments a Panel member has relative to any Proposal shall be directed to the Contact Person. Additional meetings of the Panel may be convened to initiate discussions or to develop and direct requests for information to one or more of the Proposers, the Legal Consultant, the Reference Verifier, the Financial and Security Advisor(s), or CITY staff.

- Ranking Meetings: After the Panel members have completed their individual evaluations, the Panel will reconvene to score and conduct a ranking of the Technical Proposals. The Chairman will total and average the scores of each Panel member and calculate the score for each Proposer. This will establish a numeric ranking for each Proposer based on the Technical Proposal and attachments. Additional meetings of the Panel may be convened if deemed necessary.

After the initial ranking of the Technical Proposals is finalized, the Chairman will open each Cost Proposal comprised of Cost Proposal, Bid Bond, Trench Safety Act Compliance Form, and Preliminary Schedule of Values.

- Final Ranking: The Cost Proposal Score will then be added to the Technical Proposal Evaluation Score and the Evaluation Panel shall recommend contract award to the Proposer with the highest total score. This action will end the duties of the Evaluation Panel.

1.6.3 Basis of Scoring

A ranking of Proposers submitting, with higher point totals being desirable, shall be based on weighted scoring criteria for the Proposals as follows:

<u>Technical Proposal Points</u>	<u>(Maximum 600 Points)</u>
Letter of Transmittal	no points
<u>Qualifications/Experience</u> (Maximum 200 Points)	
Proposer's experience in providing proposed services, including demonstrating relevant design/build and LEED experience	0 - 40 points
Qualifications and experience of Project Manager	0 - 30 points
Qualifications and experience of Key Personnel assigned to the Project	0 - 30 points
Qualifications, experience, and past performance of Proposer	0 - 20 points
Qualifications, experience, and past performance of Subcontractors	0 - 20 points
Number of other projects that all or some of proposed team and Subcontractors have worked together	0 - 20 points
Familiarity with local conditions	0 - 20 points
Description of past (within last 5 years) and on-going litigation involving Proposer and Subcontractors	0 - 20 points
<u>Project Approach</u> (Maximum 200 Points)	
Documentation of understanding of Scope of Work and requirements	0 - 40 points
Proposer's approach to designing and permitting the Project	0 - 25 points
Proposer's approach to constructing the Project	0 - 25 points
Proposer's approach to LEED Certification process	0 - 10 points
Management structure for Proposer and Subcontractors	0 - 20 points
Proposer's resources, capacity to perform, and Mobilization Plan	0 - 20 points
Quality and sufficiency of staffing plan and organizational structure	0 - 20 points
Project Schedule and proposed Milestones	0 - 20 points
Proposed quality assurance/quality control program	0 - 20 points

Financial Stability (Maximum 100 Points)

Years Proposer's company has been in business	0 - 25 points
Proposer's net worth and working capital	0 - 25 points
Size of projects successfully completed in the past 5 years	0 - 25 points
Strength of latest financial statement	0 - 25 points

Past Performance (Reference Verification) (Maximum 100 Points)

Responsiveness to problems	0 - 25 points
Projects completed on time and within budget	0 - 25 points
Quality of project	0 - 25 points
Overall satisfaction of Owner	0 - 25 points

Cost Proposal Points**(Maximum 400 Points)**

Lowest Lump Sum	400 points
Between 100.1% and 102% of Lowest Lump Sum	385 points
Between 102.1% and 104% of Lowest Lump Sum	370 points
Between 104.1% and 106% of Lowest Lump Sum	355 points
Between 106.1% and 108% of Lowest Lump Sum	340 points
Between 108.1% and 110% of Lowest Lump Sum	325 points
Between 110.1% and 112% of Lowest Lump Sum	310 points
Between 112.1% and 114% of Lowest Lump Sum	295 points
Between 114.1% and 116% of Lowest Lump Sum	280 points
Between 116.1% and 118% of Lowest Lump Sum	265 points
Between 118.1% and 120% of Lowest Lump Sum	250 points
Between 120.1% and 122% of Lowest Lump Sum	235 points
Between 122.1% and 124% of Lowest Lump Sum	220 points
Between 124.1% and 126% of Lowest Lump Sum	205 points
Greater than 126% of the Lowest Lump Sum	190 points

Total Possible Points -----1000 Points

1.7 Bid Bond

Attachment D provides the bid bond forms to be completed by the Proposer.

2. Contract

2.1 Contract package

Attachment E provides the contract.

2.2 Performance Bond

Attachment F provides the performance bond forms to be completed by the Proposer.

2.3 Payment Bond

Attachment G provides the payment bond forms to be completed by the Proposer.

2.4 General Conditions of the Contract (EJCDC)

Attachment H provides the standard general conditions of the contract.

2.5 Supplementary Conditions of the Contract

Attachment I provides the supplementary conditions to the contract.

3. Scope of Services

3.1 Project Management Services

The Design/Builder will prepare a Project Management Plan (PMP), which will define the project team, project schedule, list of major deliverables, and lines of communication. A draft copy of the PMP will be submitted to the CITY's Project Manager for review and comment not more than 15 days after Notice to Proceed. The Design/Builder will participate in a kick-off meeting with the CITY not more than 25 days after Notice to Proceed, to review the draft PMP and confirm project objectives. Following the meeting, the PMP will be revised, as appropriate based on CITY comments, and copies of PMP will be mailed to the CITY's Project Manager and project team members.

A project schedule will be developed as part of the PMP using Microsoft Project or approved similar software. Subtasks, duration for each subtask, milestones, and the inter-relationship of subtasks will be identified in the schedule. Overall project design, permitting and construction progress will be monitored against this schedule. Progress will be reviewed and recovery action will be recommended by the Design/Builder at monthly status review meetings. The Design/Builder will perform design reviews, construction inspections and quality control reviews, and prepare monthly updates to the schedule.

The Design/Builder and CITY will conduct monthly status review meetings to discuss project status and matters concerning project accomplishments and scheduling. The Design/Builder will prepare and submit to the CITY's Project Manager an agenda prior to each meeting and meeting minutes following each meeting. The meeting minutes will document activities and decisions occurring during the meeting, describe current project activities, identify activities planned during the next month, indicate issues requiring the CITY's attention, and report the status of the project budget and schedule.

Design/Builder will prepare draft minutes and final minutes for all meetings including, but not limited to, kick-off meeting, monthly status review meetings, pre-construction conference and construction progress meetings. Draft minutes will be distributed to meeting attendees and others as deemed appropriate, for review and comment. Final wording of the minutes will be discussed and approved at the next scheduled meeting or other time agreed upon by the attendees. Design/Builder shall make the revision agreed upon and distribute final minutes to the attendees.

The Design/Builder will monitor costs versus the approved project cost to complete. Beginning with initial contract award, the cumulative amount of committed funds will be carefully monitored by Design/Builder. Data will be continuously compared to the approved budget and updated by means of the following reports:

- *Cost/Budget Report:* A contract cost report, summarizing the current financial status of the project, will be developed by Design/Builder and issued monthly to the CITY. The report includes the approved cost, and notes all variances from that cost due to changes initiated by the Design/Builder.
- *Budget & Contract Status Report (BCS):* The BCS report is a combined cost and accounting report providing cost and billing information by major work division. The original cost is updated to reflect any scope development changes. Work in place, off-site materials storage, reserves withheld, previous billing and current payments per trade division are represented in the summary analysis. This report is issued monthly with the Design/Builder's application for payment, and represents a one-page summary of the total cost and payment position on the project.

3.2 Permitting Services

Under this Task, the Design/Builder will identify, prepare, and obtain all federal, state, local and water management district permit applications or permit modifications required for the construction of the Public Transportation Facility (PTF). Activities including contacting regulatory authorities, preparing permit applications, preparing written responses to review comments from regulatory authorities, and attendance at meetings to resolve outstanding issues. This may include, but is not limited to the following permits:

Permit	Issuing Agency
Environmental Resources Permit (ERP)	SFWMD
FDEP Well Permit	FDEP
FDEP NOI NPDES Permit	FDEP
Watermain Extension Permit	FDOH
Sanitary Sewer Force Main and Pump Station	FDOH
Key West Resort Utilities Developer Agreement	KW Resort Utilities
Key West Major Development Permit	City of Key West
Key West Tree Commission	City of Key West
Building Permit	City of Key West

The Design/Builder shall prepare and provide the CITY with signed and sealed copies of all permit applications or permit modifications and attachments that are submitted to regulatory agencies for the Project. Design/Builder will pay all permit application fees. The Design/Builder shall address and resolve all comments and questions, and provide additional information to the regulatory agencies as needed. The Design/Builder has sole responsibility for obtaining all permits for the project. CITY will coordinate publications of

the Notice of Intent from the permitting agencies, when required. The CITY will be named as Permittee on all permits.

The CITY has received an ERP from SFWMD (Permit No. 44-00076-S) [Appendix D]; Major Development Permit Approval from the City of Key West and Tree Commission Approval from the City of Key West. The Design/Builder shall substantially comply with these permit approvals and/or modify these permit, as necessary, to incorporate any changes in design concepts or operational procedures incorporated during the design.

3.3 Design Services

The Design/Builder will conduct a project initiation conference with the CITY, and the Design/Builder's design engineer to discuss and confirm the project approach.

Design/Builder will provide engineering services to the CITY to finalize current design concepts, equipment specification, and facility layout. The Design/Builder will prepare Drawings and Specifications for the construction of the PTF. Design concepts presented in the RFP will be modified as necessary to comply with regulatory permit conditions and as necessary to obtain CITY acceptance prior to incorporation into the final Construction Documents. This facility will be designed and constructed to qualify for Certification under LEED 2009 for New Construction and Major Renovations. Plan, cross section, and detail drawings and technical specifications will be prepared for the components identified. The Drawings and Specifications will address architectural, structural, civil, geotechnical, mechanical, electrical, and instrumentation and control requirements for construction of the listed components. The Design/Builder will prepare and submit copies of the draft PTF drawings and technical specifications for CITY review and comment at the 60% and 90% completion level.

Design/Builder will provide a value engineering/constructability review during the 60% design phase of the project utilizing both engineers and construction personnel. The purpose of this review is to evaluate existing drawings and preliminary construction specifications, to determine whether proposed project details will create construction problems in the field and to determine whether the owner's functional objectives can be met more cost effectively through a different design approach. A value engineering/constructability review, investigating the details of the various infrastructure/building systems can help prevent major delays and expenses due to faulty construction sequencing, incomplete purchasing procedures, and design problems. A formal report will be prepared and submitted to the CITY. Specifically, the review includes:

- The identification of the best functional balance between cost, reliability, and performance of the project, while meeting the objectives of the owner;
- The evaluation of specific infrastructure/building details for practicality and efficiency of design;
- The technical review of details and infrastructure/building systems to clarify the sequence of construction and the impact of design tolerances.

Cost saving derived through the value engineering/constructability review process shall be shared equally between the Design/Builder and the CITY. Any change in Contract Price shall be incorporated into the Agreement by a Change Order or written Amendment in accordance with General Conditions, Article 11.

The Design/Builder will prepare an Operating/Maintenance and Contingency Plan to describe the operation of the PTF. This document will be used for both permitting purposes as well as of sufficient detail to describe operational and maintenance items associated with the PTF. At the beginning of plan development, the Design/Builder will meet with the CITY to discuss the potential operation and maintenance methods and receive input. The Operation/Maintenance and Contingency Plan will include the following components:

- Introduction
- Definitions
- Hours of Operation
- Staffing
- Facility and Equipment Maintenance Plans (including manufacturers' suggested maintenance information and spare parts)
- Material Storage
- Transportation
- Fire and Safety
- Management and Employee Relations
- Access
- Communications
- Records & Reports

The Design/Builder will develop a Facility Acceptance Testing Plan that addresses both functional and performance testing. Functional testing will be performed (following manufacturers certification) on individual pieces of equipment to demonstrate all operational features and controls meet the requirements specified, usually for a short period of time. Performance Testing will be performed on the entire system to document the facility meets the overall performance requirements. This test protocol will identify material handling and measurement methodologies, record keeping and safety programs. This test will be conducted over a longer period of time (minimum 1 week). Fundamental Commissioning of the building's energy systems shall also be performed according to the requirements of the LEED Reference Guide; results from functional and performance testing may be applied to the Commissioning documentation as applicable.

The Design/Builder will prepare and submit copies of the draft PTF drawings and technical specifications, Acceptance Testing Program, and Operations/Maintenance and Contingency Plan for CITY review and comment at the 60% and 90% completion level. Design/Builder will attend meetings with the CITY to receive comments on the draft documents. Following receipt of comments, the Design/Builder will revise the drawings and specifications as appropriate.

The CITY's review and acceptance of drawings and specifications and related interim design submissions is for the purpose of mutually establishing Construction Documents compatible with the requirements of the Project. Neither CITY's review nor acceptance of any drawings and specifications and related interim design submissions related to the Construction Documents shall be deemed to transfer any design liability from Design/Builder to the CITY.

3.4 Construction Services

The Design/Builder will provide engineering and construction services during construction activities.

- ***Pre-Construction Conference:*** At least 10 days prior to starting construction, the Design/Builder will schedule, attend and conduct a pre-construction conference with the CITY. The conference will be attended by Design/Builder's Project Manager, lead Design Professional, Construction Manager, and others as appropriate and will be held to discuss such topics as may include, but not be limited to: schedules; procedures for handling operation & maintenance manuals and other submittals, and for processing Applications for Payment; maintenance of traffic; initiation of coordination with affected utilities; LEED process and documentation requirements; and to establish a working understanding among the parties as to the Project. The Design/Builder will provide the CITY with a completed copy of the Design/Builder /Subcontractor/Supplier Information at or prior to the Pre-Construction Conference.
- ***Prepare a Revised Project Management Plan:*** The Design/Builder will revise the PMP to include construction subcontractors, schedule, and address construction health and safety procedures and requirements.
- ***Operation & Maintenance (O&M) Manual Review:*** O&M Manual shall be required for all equipment installed by the Design/Builder prior to startup. The Design/Builder shall be responsible for the review and approval of all O&M manuals submitted by the Design/Builder's construction subcontractor and/or suppliers. The Design/Builder shall notify the CITY upon receipt of O&M manuals to afford the CITY the opportunity to perform a concurrent review. Concurrent review by the CITY shall be solely at the CITY's discretion and shall be completed within 10 days of the receipt of notice from the Design/Builder. CITY comments will be provided to the Design/Builder for incorporation into the Design/Builder's response.

Any review by the CITY shall be only for general conformance with the intent of the equipment for the Project and for compliance with the information given in the Agreement. The acceptance of a separate item as such will not indicate approval of the assembly in which the item functions. The CITY's acceptance of O&M manuals shall not relieve the Design/Builder from its responsibility for any deviations from the requirements of the Construction Documents, unless the Design/Builder has in writing called the CITY's attention to such deviation, and the CITY has given written acceptance to the specific deviation; nor shall any acceptance by the CITY relieve the Design/Builder from responsibility for errors or omissions in the O&M Manuals.

- ***Construction Waste Management Plan:*** The Design/Builder will provide a plan for waste management during construction in order to reduce the amount of waste material sent to landfill. The plan shall include, at a minimum, the waste diversion goals (75% minimum,) types of materials to be diverted, method of diversion (recycling, re-use, donation, etc.), implementation protocols, documentation procedures, and responsible parties. Refer to LEED Reference Guide.

- ***Indoor Air Quality Management (During Construction) Plan:*** The Design/Builder will provide an indoor air quality management for implementation during construction in order to reduce contaminants which may inhibit the well-being of construction workers and building occupants. The plan shall meet the requirements outlined in the LEED Reference Guide, for Indoor Environmental Quality Credit 3.1, Construction Indoor Air Quality Management Plan – During Construction.
- ***Indoor Air Quality Management (Before Occupancy) Plan:*** The Design/Builder will provide an indoor air quality management for implementation immediately prior to occupancy in order to reduce contaminants which may inhibit the well-being of building occupants. The plan shall meet the requirements outlined in the LEED Reference Guide, for Indoor Environmental Quality Credit 3.2, Construction Indoor Air Quality Management Plan – Before Occupancy.
- ***Field Technical Assistance and Issue Clarifications:*** The Design/Builder will provide general technical information and additional data or drawings to resolve unforeseen conditions encountered during construction, provide clarifications and interpretations of the Construction Documents, and respond to Subcontractors requests for information.
- ***Construction Progress Meetings:*** The Design/Builder will conduct periodic (monthly, at minimum) construction progress meetings with construction subcontractors and/or suppliers and CITY representatives, to review Design/Builder’s work progress and scheduled activities, coordination between different contractors on-site, coordination with Department of Transportation Staff, sustainability/LEED requirements, and to discuss and resolve construction related issues.
- ***Substantial and Final Inspections:*** The Design/Builder, in conjunction with the CITY, will conduct a substantial completion inspection to determine if the Project is substantially complete. The Design/Builder, in conjunction with the CITY, will conduct a comprehensive final inspection at the end of the Project to determine if the Project is complete in accordance with the requirements of the Construction Documents.
- ***Facility Acceptance Testing:*** The Design/Builder will conduct and document both functional and performance testing of the equipment and facility.
- ***Fundamental Commissioning:*** The Design/Builder will engage a qualified Commissioning Authority (CxA) to lead, review and oversee the completion of commissioning activities of the project’s energy systems, in accordance with the LEED Reference Guide, Energy and Atmosphere Prerequisite 1, Fundamental Commissioning of Building Energy Systems.
- ***Measurement and Verification Plan:*** The Design/Builder will provide a Measurement and Verification Plan, to provide for the ongoing accountability of the facility’s energy consumption over time, in accordance with the LEED Reference Guide, Energy and Atmosphere Credit 5, Measurement and Verification.

- ***Thermal Comfort Verification Survey:*** The Design/Builder will assist the Owner in preparing a Survey of Thermal Comfort to be conducted within six to eighteen months after occupancy, in order to provide for the assessment of building occupants' thermal comfort over time, and shall contain provisions for creating a plan of corrective actions if necessary. The Survey shall be developed and conducted in accordance with the LEED Reference Guide, Indoor Environmental Quality Credit 7.2, Thermal Comfort - Verification.
- ***Record Drawings:*** The Design/Builder will maintain certified as-built drawings during construction and prepare record drawings for submittal to the CITY prior to Final Completion.
- ***Inspection Services during Construction:*** The Design/Builder will perform inspection and quality assurance/quality control services during construction to document construction and installation procedures, observe the construction subcontractor's activities, and to verify that the construction of the Project is completed in accordance with the Construction Documents. The Design/Builder will provide the services of a materials testing laboratory to perform field and laboratory materials testing and to monitor quality assurance/ quality control, as required by the Agreement and/or Construction Documents.
- ***Prepare Certification of Construction Completion:*** The Design/Builder will compile construction data, as-built drawings, and the Construction Quality Assurance Report, and prepare Certifications of Construction Completion as required by applicable permits. Design/Builder will respond to agency requests for additional information to obtain the Certifications of Completion.
- ***Construction Services:*** The Design/Builder shall provide through itself or subcontractors the necessary supervision, labor, inspection, testing, start-up, material, equipment, machinery, temporary utilities and other temporary facilities to permit Design/Builder to complete the construction of the PTF consistent with the Construction Documents. Design/Builder shall perform all construction activities efficiently and with the requisite expertise, skill and competence to satisfy the requirements of the Construction Documents. Design/Builder shall at all times exercise complete and exclusive control over the means, methods, sequences and techniques of construction.
- ***Construction Coordination:*** Design/Builder shall coordinate the activities of all subcontractors. If CITY performs other work on the Project or at the Site with separate contractors under CITY's control, Design/Builder agrees to cooperate and coordinate its activities with those of such separate contractors so that the Project can be completed in an orderly and coordinated manner without unreasonable disruption.

- **Scheduling:** During the construction phase, Design/Builder will actively manage field construction activities for the project. The Design/Builder will aggressively monitor progress and performance on site to ensure that the master schedule and project specification developed during the design phase is followed. Listed below are some of the major activities to be performed during the construction phase.
 - *Master Schedule:* Design/Builder will utilize the master schedule developed during pre-construction activities as the roadmap for monitoring performance. The master schedule shall be updated monthly and modified as needed during construction to incorporate any field changes.
 - *Resource Allocation Control System Chart:* When the preliminary construction budget and overall project duration is established, a Resource Allocation Control System (RACS) chart will be developed to allocate man power and work in place rate over construction time. Principal construction activities will be outlined in bar chart form and summarized on one sheet of paper showing the duration of all construction efforts, productivity on a major trade basis, projected value of work in dollars per month, cash flow requirements per month, and percentages of overall work completed per month. The RACS shall be updated monthly throughout the pre-construction and construction phases.

3.5 Deliverables

- Five copies of the draft and final Project Management Plan (PMP)
- Five copies of the Value Engineering/Constructability Review Report
- Five copies of the 60% complete design documents (Plans: 3 full-sized, 2 half-sized)
- Five copies of the 90% complete design documents (Plans: 3 full-sized, 2 half-sized)
- Five copies of all permit documents
- Five copies of Operating/Maintenance and Contingency Plan
- One set of unbound Construction Documents with half-sized Drawings, and four sets of full-sized final Construction Documents at the pre-construction conference
- Five copies of all approved O&M manuals
- Five copies of all equipment guarantees and warranties
- Five copies of draft Certification of Construction Completion including the Construction Quality Assurance Report and half-sized record drawings
- Five copies of final Certification of Construction Completion including the Construction Quality Assurance Report and half-sized signed and sealed record drawings.
- Four sets of full-sized signed and sealed Record Drawings
- Two sets of half-sized Record Drawings
- Meeting minutes of all meetings.
- Monthly progress report including schedule and cost control information

Design/Builder shall provide an electronic copy of all deliverables to the CITY on CD ROM. Acceptable formats include Word, Excel, Microsoft Project, and AutoCAD (2012 version). Other formats may be utilized as mutually agreed by the parties.

4. Demolition

4.1 Introduction

This section defines the criteria for **Phase 1 - Demolition and Closure** of the existing Southernmost Waste to Energy facility that is the site of the future Key West Transit Facility. Presented herein is the available information on the site and the facilities above and below ground. This information is not all inclusive but is the best available. In addition to the demolition requirements presented herein, the site shall be leveled and 2 feet of clean, acceptable fill placed over the entire site to complete the cleanup requirements required by the Florida Department of Environmental protection (FDEP). Specific issues are addressed in this section, but are not meant to be all inclusive. Therefore, the Design/Builder is ultimately responsible for determining the full range and impact of the demolition. Also, the Design/Builder is responsible for obtaining any City, County or State permit(s) required. Please refer to Appendix E.

4.2 Demolition

4.2.1 Introduction

This section addresses the requirements and standards that may apply to the site demolition and closure. Included is a list of the major structures to be removed, the results of asbestos and lead based paint inspections, limits of the demolition, a brief description of the demolition and the requirements to close the site that are the responsibility of this contract.

4.2.2 Existing Site Conditions

The site is located on Stock Island, Key West, Monroe County, Florida, at 5701 College Road. The site is on the northwest side of College Road, adjacent to the former landfill site. It is approximately 3.8 acres in size. Currently, the topography of the site is relatively flat, with the ground surface generally ranging from an elevation 5 feet above mean sea level (msl) to an elevation 17 feet above msl.

The proposed site was previously used as a solid-waste-to-energy facility.

Drawing D-02 shows the main structures to be demolished or salvaged on the site.

Drawing D-03 shows the temporary ground water monitoring wells and gas monitoring probes to be abandoned/demolished. Abandonment/demolition of wells shall meet the requirements of FDEP.

An electrical transformer, electrical equipment with electric meter and water meter near College Road that supplies the police Storage Yard will remain. Existing trees and vegetation are to be removed, with the exception of selected coconut palms, Christmas palms, thrinax, and selected mahogany trees which are to be transplanted to a location to be determined by the City. Any equipment and/or material located on site and/or within the buildings at the time of the pre-bid meeting are to be disposed of by the Design/Builder in accordance with any State, Federal or Local requirements by the Design/Builder.

4.2.3 Site Demolition Requirements

All material above ground and to a depth of 4 feet below proposed capping grade is to be removed and properly disposed of or salvaged. Building foundations and utilities located greater than 4-feet below proposed capping grade are to be abandoned in-place with the top 4-feet removed. All underground storage tanks are to be removed in their entirety. The Design/Builder is responsible for testing of tank contents when necessary and ensuring proper disposal.

The site will be preliminarily graded to the elevations shown on Drawings D-04 and D-05. After the proposed capping grade elevations have been obtained two (2) feet of clean, suitable fill will be placed over the entire site and compacted to match the final grade shown on drawing D-06.

The fill will be placed in 8-inch lifts and compacted to 98 percent relative compaction within the influence area beneath structures, slabs, pavement, curbs and trenches. Other areas shall be compacted to 90 percent relative compaction.

4.2.4 Erosion and Sedimentation Control

The FDEP and SFWMD require erosion and sedimentation control measures for all demolition and construction activities. The requirements are based on best management practices to prevent onsite silt from migrating off the construction site. The Design/Builder shall submit, obtain and implement an Erosion and Sedimentation Control Plan. Sediment and erosion control measures shall be in place prior to any land disturbance or demolition activity.

4.3 Asbestos and Lead-Based Paint Removal

Asbestos and lead-based paint investigations were performed by EE&G Environmental Services, LLC for the site. The inspection reports are located in Appendix G. No asbestos was detected, however, lead-based paint was found at several locations. The Lead-Based Paint Inspection Report includes recommendations for removal of the paint and reporting requirements for FDEP. The Design/Builder shall implement acceptable practices for the removal and disposal of the lead-based paint.

An asbestos notification (DEP Form 62-257.900(1)) is required to be submitted to FDEP ten (10) business days prior to the start of demolition activities. This is required even if there is no Asbestos Containing Materials (ACM) in the project.

Form shall be submitted to;

Barbra Nevins

Environmental Specialist III

Waste Management/Air Resources

Department of Environmental Protection

2796 Overseas Highway, Suite 221

Marathon, FL 33050

5. Technical Requirements

5.1 Introduction

The general technical requirements are presented herein as a guideline for the minimum criteria to be followed during **Phase 2 - Design, Permitting and Construction** of this project. These criteria, in conjunction with the project specific design criteria, shall provide the basis of design for this project.

These guidelines describe the minimum requirements. Deviations from the guidelines that are in the best interest of the City and demonstrate a better design will be allowed as long as the City approves the deviation in advance. Documentation, including calculations and cost estimates, must be developed in enough detail so the City can evaluate the proposed deviations.

The Design/Builder shall be responsible for providing a thorough design, and for installing working systems which meet all prevailing codes and good construction practices. It is the responsibility of the Design/Builder to be knowledgeable of appropriate codes, and to follow them accordingly to ensure that the project conforms to all applicable standards and regulations. Local codes and ADA standards shall be applied as appropriate. Where multiple codes and regulations are referenced, the most stringent guidelines shall apply.

5.1.1 Regulatory Requirements

The following requirements and standards shall be followed, in the latest editions unless specifically noted, and shall be confirmed with the local Building Department at the time of development of the Design/Builder proposal:

- Florida Building Code (FBC) 2010, with approved amendments by Key West and Permits Administration.
- Florida Mechanical Code
- Florida Plumbing Code
- Florida Fuel Gas Code
- Florida Test Protocols for High Velocity Hurricane Codes
- Florida Accessibility Code (FBC Chapter 11)
- Florida Energy Efficiency Code (FBC Chapter 13)
- City of Key West Code of Ordinances
- Florida Fire Prevention Code 101
- National Electric Code (NEC) (NFPA 70)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA) Standards:

- NFPA 13 – Standard for the Installation of Sprinkler Systems
- NFPA 30A – Code for Motor Fuel Dispensing Facilities and Repair Garages
- NFPA 101 – Code for Safety to Life from Fire in Buildings and Structures (Life Safety Code)
- NFPA 230 - Standard for the Protection of Storage.
- NFPA 291- Recommended Practice for Fire Flow Testing and Marking of Hydrants.
- Fire extinguishers shall be provided and located per NFPA 10 – Standard for Portable Fire Extinguishers.
- Fire alarm, detection and notification systems shall comply with NFPA 72 – National Fire Alarm Code.
- All material and equipment shall be Underwriters’ Laboratory (UL) listed or Factory Mutual (FM) approved.
- Safety Regulations of the Occupational Safety and Health Administration (OSHA)
- LEED Reference Guide for Green Building Design and Construction 2009 edition (LEED Reference Guide,) in coordination with project’s LEED Work Plan
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
 - ASHRAE Standard 90.1
 - ASHRAE Standard 62.1-2007
 - ASHRAE Standard 55-2004
- South Florida Water Management District (SFWMD) Design Requirements
- All pertinent Florida Department of Environmental Protection (FDEP) Rules and Regulations
- Florida Development Manual: A Guide to Sound Land and Water Management developed by FDEP
- Florida Department of Transportation (FDOT) *2010 Standard Specifications for Road and Bridge Construction*
- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets 2004*
- FDOT Traffic Sign Requirements

The HVAC design shall also comply with the applicable standards and recommended practices of the following organizations:

- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- Air Moving and Conditioning Association (AMCA)
- Associated Air Balance Council (AABC)
- National Environmental Balancing Bureau (NEBB)
- American Conference of Governmental Industrial Hygienists (ACGIH)

The Plumbing design shall also comply with the applicable standards and recommended practices of the following organizations:

- American Society of Plumbing Engineers (ASPE)
- American Society of Testing Materials (ASTM)

- American Water Works Associations (AWWA)
- American National Standards Institute (ANSI)

The Electrical design shall also comply with the latest editions of the following applicable codes, standards and recommended practices of the following:

- Life Safety Code (NFPA-101-HB)
- American National Standards Institute (ANSI)
- Illuminating Engineers Society (IES)
- Instrument Society of America (ISA)
- National Electrical Manufacturers Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- Insulated Cable Engineers Association (ICEA)
- American Society for Testing and Materials (ASTM)
- Underwriters Laboratory (UL)
- Environmental Protection Agency Technical Bulletin (EPA-430-99-74-001)
- All applicable codes of Keys Energy Services
- All applicable regulations of the Telephone Company
- All applicable regulations of the Key West Fire Department

This facility will be designed and constructed to qualify for Certification under LEED 2009 for New Construction and Major Renovations. The Design/Builder shall refer to the LEED Reference Guide for Green Building Design and Construction, 2009 Edition (LEED Reference Guide,) for specific requirements to achieve Certification. See Appendix B for the preliminary LEED Project Checklist.

This list is not intended to be all-inclusive, and some additional requirements may be listed herein, or found outside the scope of this document. See individual sections' Technical Requirements for additional information.

5.1.2 Coordination

The following list of activities shall be used to facilitate the coordination process with architecture and among other disciplines. This list is not all-inclusive and does not relieve the Design/Builder from ensuring thorough coordination and adherence to all applicable regulatory requirements.

5.1.2.1 General

- Coordinate for adherence to and documentation of Construction Waste Management Plan throughout construction.
- Coordinate selection and documentation of materials having recycled content and/or acquired locally.
- Coordinate for adherence to Indoor Air Quality Management Plans throughout construction.
- Coordinate for documentation of LEED credits throughout design and construction.

5.1.2.2 Site

- Participate in developing the layout, circulation, and orientation for all facilities on the site.
- Coordinate Erosion and Sedimentation Control Plan and implementation and documentation of control measures throughout construction.
- Review the effects of grading and drainage on the structures. Coordinate the location, elevation, and gradient of slabs, sidewalks, ramps, entrance, and equipment pads.
- The buildings will require storm roof drainage, which will need to be designed in coordination with grading to utilize on-site storm water ponds.
- Coordinate the location of hose bibs with layout of yard piping and functional requirements.
- Coordinate site lighting with architecture and electrical.
- Review fire truck/emergency vehicle circulation.
- Site security coordination, including fencing and gate locations.
- Coordinate selection of hardscape materials to maximize use of permeable materials and to provide hardscape materials with a Solar Reflectance Index (SRI) of at least 29.

5.1.2.3 Landscaping

- Coordinate landscaping and irrigation, if required, with site grading and drainage.
- Selection of native/adapted species to minimize water and maintenance requirements.
- Coordinate landscaping to provide summer shading of building openings so as not to compromise personnel security.
- Coordinate landscaping to prevent obstruction of door and window openings, and consider the effects of heat and fumes from ventilation and vehicle exhaust on the plantings.
- Coordinate landscaping to provide shading of at least 50% of site hardscape within five years of installation.
- Coordinate landscaping to provide visual screening of items identified as objectionable.

5.1.2.4 Structural

- Verify concrete finishes and moisture proofing for walls and slabs; coordinate requirements for vapor retarders
- Coordinate location and type of construction, and control joints; coordinate selection of form work and determine if it is compatible with the desired concrete finishes.
- Coordinate with structural engineer for railing material, types, and installation detail; determine if railing conforms to codes and safety regulations.

- Coordinate rise, run, material, and detail of all stairs, interior and exterior; verify that the design conforms to codes and safety regulations.
- Coordinate clear room height requirements, especially with respect to overhead door coil and motor requirements.
- Coordinate interior depressed slabs for tile and other materials as required.
- Coordinate size, detail, and location of all floor, wall, and roof openings.
- Coordinate roof and floor slopes and floor-drain elevations for proper drainage; verify need for sloping structure or topping material.
- Coordinate selection of roof framing system.
- Review framing schemes for column locations and size, beam clearances, and their effects on the work of other disciplines and functional needs of the building.
- Verify requirements for termite resistant construction.
- Verify types of exposed metals and painted finishes to be used to resist corrosion. Each environment has its own requirements. For sustainability requirements of corrosion-resistant coatings, refer to the LEED Reference Guide.

5.1.2.5 Mechanical, Plumbing, Fire Protection

- Coordinate "U"-factor requirements for walls and roof. (U-factors must meet energy code requirements.)
- Coordinate size, detail, and location of all floor, wall, and roof openings.
- Select, coordinate, and detail insulation materials.
- Coordinate size, location, and types of wall louvers; coordinate required roof penetrations. Coordinate and determine final size, location, and numbers of wall louvers. Schedule louvers. All louvers and roof penetrations are to comply with the Florida Building Code wind and impact requirements.
- Verify and coordinate plumbing fixture count, type, layout, and location. Provide plumbing chases as applicable. Coordinate documentation of water usage.
- Verify the location of all floor and roof drains.
- Specific plumbing and HVAC requirements of the Bus Wash building shall be coordinated with the bus-wash system manufacturer.
- Verify size, location, and access requirements for all HVAC equipment. Coordinate documentation of refrigerants and filtration for specified equipment.
- Review duct locations, air diffuser, and grille selection and placement for compatibility with ceiling system.
- Coordinate NFPA requirements by room and area within each structure.
- Coordinate location of internal and external hose bibs and hose racks.

- Coordinate requirements for Fundamental Commissioning of Building Energy Systems as outlined in the LEED Reference Guide, Energy and Atmosphere Prerequisite 1.
- Coordinate sprinkler head layout with HVAC ceiling diffuser layout and lighting layout.
- Coordinate fire alarm requirements with the electrical drawings.
- Coordinate exhaust/supply fan shutdown with HVAC.

5.1.2.6 Electrical

- Site, interior, and exterior lighting shall be coordinated for Light Pollution Reduction; refer to the LEED Reference Guide.
- Review light fixture selection, and coordinate layout and compatibility with ceiling system, air diffusers and grilles.
- Coordinate exterior, wall mounted, and special accent site lighting.
- Coordinate size, detail, and location of all but small conduit, floor, wall, and roof openings.
- Verify with Owner the power requirements of machines and other equipment not supplied and installed as part of the contract.
- Coordinate location, outlets, and access requirements for all electrical panels, and equipment including office, shop, and break room appliances and machines. Coordinate wall openings for HVAC equipment.
- Coordinate NFPA requirements by room and area within each building and structure.
- Specific lighting and electrical requirements for the Bus Wash building shall be coordinated with automated bus-wash system manufacturer.

5.1.3 Life-Cycle Cost Effectiveness

Materials, systems, and equipment shall be chosen on the basis of long-term performance, not short-term cost. The following factors shall be considered when selecting materials and components:

- Life expectancy
- Suitability
- Durability
- Ease of maintenance
- Compatibility with substrate material
- Effect on other disciplines

Each of these factors shall be rated to achieve the maximum life-cycle cost effectiveness.

5.1.4 Maintenance

This section provides information to decrease material variations and to enhance maintenance servicing. Common features throughout facility shall include:

- Door hardware

- Coating systems
- Ceiling systems
- Roofing systems
- Luminaires
- Toilet/bath accessories
- Dispensers and controls
- Tile, Paint and other interior finishes

Designing buildings with multiple common elements shall minimize repair time, reduce parts inventory, and make maintenance easier. Utilize single source/manufacturer for related products where practical.

5.2 Site/Civil

5.2.1 Detailed Field Surveys

Field surveying and existing available topography will be supplied to the Design/Builder **for informational purposes only**. The Design/Builder will be responsible for obtaining all required survey information to provide the complete project. The Design/Builder shall follow these guidelines:

- All new field survey data shall be entered in the survey and mapping electronic database.
- Each new survey shall be assigned a separate file designation
- All final as-built drawings of utilities and facilities shall be provided after construction has been completed.

5.2.1.1 Horizontal Coordinate System

All new construction shall be tied to the State Plane Coordinate System, Florida East Zone North American Datum 1983 (NAD 83) (Adjustment 1990) and all distances must be in feet.

5.2.1.2 Vertical Control Datum and Benchmarks

Vertical controls shall reference the National American Vertical Datum 1988 (NAVD 1988), and all elevations must be in feet. Permanent horizontal and vertical controls shall be identified and used in the construction phase.

5.2.2 Design Documentation

5.2.2.1 Site Drawing Organization

The site plans shall be organized as follows:

- Drawings shall be parallel or perpendicular to a grid system.
- The drawing scale for site layout and grading plans shall be 1 inch = 30 feet (or larger) with common match lines as required.

Site drawings shall be organized as follows:

- Existing Topography
- Horizontal Control/Geometry Plans
 - New structures and facilities with coordinates and dimensions
 - Pavement types and limits
 - Concrete joint types and dimensions
- Finished Grading/Vertical Control Plans
 - Existing contours (gray scale)
 - Finished grade contours and spot elevations
 - Roadway intersection grading details at a larger scale
 - Storm drainage system and details

- Yard Piping Plans
 - Existing underground facilities, pipelines, and structures
 - New sanitary sewers
 - New domestic water lines
 - New fire protection water lines
 - Other outside piping and underground electrical structures not discussed elsewhere or included for conflict resolution
 - Storm drains shown for conflict resolution only
 - Profiles for all gravity utilities
 - Details
- Traffic Signing and Striping Plan
- Erosion and Sedimentation Control Plans
 - Temporary BMP's during construction
 - Permanent BMP's
- Landscaping Plans

5.2.2.2 Typical Construction Details

Typical construction details shall be developed for the site improvements.

5.2.2.3 Existing and New Geotechnical Data, Soil Borings, and Explorations

The CITY has obtained a preliminary geotechnical investigation of the site *for informational purposes only* (Appendix C). The Design/Builder shall be responsible for performing all geotechnical investigation/studies to satisfy their requirements for the complete project. See Structural Technical Requirements (Section 6.4) for additional information.

5.2.2.4 Site Utilization and Construction Staging Plan

The Design/Builder will prepare the site utilization plan. This drawing indicates authorized staging and laydown areas for the project and should be designed to minimize site disturbance and facilitate efficient storage, handling, and recycling of construction materials and debris. Examples of construction support activities shown on this drawing include access roads to the construction sites; utilities such as power, water, sanitary, and telephone hookups; transportation logistics; and other common services required to support the construction activity.

5.2.2.5 Civil Legend, Abbreviations, Schedules, and Notes

Drawings must include the following:

- Civil legend
- List of acronyms and abbreviations
- Notes providing direction regarding critical areas not adequately defined in the drawings

The drawings shall be sufficiently detailed to identify and clarify symbols, line work, and abbreviations used throughout the drawings. The following acronyms and abbreviations shall be used for all site development documents:

Element	Acronyms and Abbreviations
Top of Curb	TC
Flowline	FL
Ridge	RDG
Grade Change	CG
Top of Slope	TOC
Toe of Slope	TOS
Invert Elevation	IE
Finished Grade	FG
Existing Grade	(Screened)
Concrete	Conc
Asphaltic Concrete	AC
Pavement	Pvmt
Edge of Pavement	EP
Shoulder	Shldr
Joint	Jnt
Finished Floor Elevation	FF
Top of Wall Elevation	TW
Catch Basin/Inlet	CB
Manhole	MH
Rim of Top Elevation of Catch Basin/Inlet	TE
Reinforced Concrete Pipe	RCP
Corrugated Metal Pipe	CMP
Polyvinyl Chloride Pipe	PVC
High Density Polyethylene Pipe	HDPE
Benchmark	BM
Temporary Benchmark	TBM
Point of Horizontal Curvature or Beginning of Curve	PC
Point of Horizontal Tangent or End of Curve	PT
Point of Horizontal Intersection	PI
Point of Vertical Curve or Beginning of Vertical Curve	PVC
Point of Vertical Tangent or End of Vertical Curve	PVT
Point of Vertical Intersection	PVI
PVI to Point on Vertical Curve	e
Curve Data:	
Radius	R
Delta	Δ
Length	L

Element	Acronyms and Abbreviations
Tangent	T

5.2.3 Roadway/Street Systems

The Design/Builder shall construct new roads with either reinforced concrete or hot plant-mix bituminous pavement. Critical areas that use heavy-duty reinforced or unreinforced concrete paving and heavy truck traffic areas require special consideration.

For road construction the following guidelines shall be followed:

- The design vehicle for the main roadway shall be an Intercity Bus BUS-14 [BUS-45] per AASHTO's design guidelines.
- Show all data required for constructing the travel way.
- Include curve geometry, pavement widths, coordinates to key features, elevations, contours, utilities, and drainage structures.

5.2.3.1 Widths

Roadway widths (measured face-to-face of curbs, or edge of pavement to edge of pavement) shall be a minimum of 24 feet wide for two-way traffic roadways; minimum 15 feet wide for one-way traffic roadways. This limitation is based on the design vehicle and use of the roadways for fire trucks and emergency vehicles.

5.2.3.2 Grades

Longitudinal grades on curbed roadways shall not be less than 0.5 percent. To improve gutter drainage along curved sections of curbed roadways and along curb radii at intersections, the Design/Builder shall use a minimum gutter slope of 0.7 percent. Uncurbed roadways with open ditches for drainage shall have a 0.5 percent longitudinal grade if ditch drainage can be maintained. The maximum desirable roadway grade must not exceed 4 percent. Grades up to 6 percent may be used in extreme cases only.

5.2.3.3 Transverse Slopes

The Design/Builder may use crowned sections with 2.00 percent minimum transverse slopes along paved roadways. Special care shall be taken in grading intersections so drainage from the intersection area to the gutters and catch basins or the ditches is adequate. Sheet drainage from beyond the roadway corridor across the entire roadway width or intersection area is not permitted.

Drainage, roadway intersections, parking areas, and other warped vehicular traffic areas shall have a minimum slope (combined longitudinal and transverse slope) of not less than 1.0 percent.

Roadway drainage must be directed away from areas where pedestrians walk, unless raised curbs and sidewalks are provided for pedestrian traffic.

5.2.3.4 Parking Areas

Automobile parking areas shall be planned to accommodate employee, facility and visitor vehicles. Spacing for compact cars is not permitted. Appropriate size parking spaces shall be provided. The Design/Builder shall review the number of parking spaces required by the City of Key West Code of Ordinances, as provided in the approved City of Key West Major Development Permit and any applicable federal and local requirements, and shall not exceed requirements.

Suggested POV Parking Stall Dimensions						
Angle (deg)	Width Stall (ft)	Depth Stall (ft)	Full-Width Loaded (ft)	Single Aisle	Full-Width Loaded (ft)	Double Aisle
90	10	20	45		65	

The suggested dimensions above reflect a conservative approach for high in and out movements and short-term maintenance traffic. Accessible spaces shall be 12 feet wide and meet all requirements for ADA parking and accessible routes. Bus and truck spaces shall be 12 feet wide with a length allowance 1.2 times the maximum length of the buses/trucks.

5.2.3.5 Provisions for Site Accessibility

The Design/Builder shall provide a means of access for persons with functional limitations, which complies with ADA guidelines. Site work considerations shall include designated accessible parking spaces, curb ramps, building access ramps, and handrails. Vehicle and pedestrian ramps, except for accessible ramps, can have a maximum slope of 8 horizontal to 1 vertical (12.5 percent; accessible ramps can have a maximum slope of 12 horizontal to 1 vertical (8.3 percent,) with level rest platforms at 30 feet intervals.

5.2.3.6 Pavements

The Design/Builder shall use the AASHTO Guide for Design of Pavement Structures (latest edition).

The Design/Builder must provide separate pavement designs for:

- Heavy bus traffic areas
- Medium bus, truck and auto traffic areas
- Auto traffic areas, including parking lots

Rigid or flexible roadway and parking area pavement designs shall be based on:

- Type of traffic use – bus, truck and automobile
- Estimated traffic volume – bus, truck and automobile
- Subgrade strength developed from soil testing at the site

For bus/truck traffic, the Design/Builder shall observe the following requirements:

- Minimum Pavement Thicknesses:
 - Asphaltic concrete in parking areas 2 ¾ inches

- Asphaltic concrete in streets and roads 4 inches
- Concrete walkways and sidewalks 4 inches
- Reinforced concrete in parking areas 6 inches
- Reinforced concrete in streets and roads 8 inches
- Special heavy-duty areas (reinforced) 10 inches
- Maximum Concrete Joint Spacing (all joint types):
 - Walkways and sidewalks 10 feet
 - Curbs and gutters 15 feet (line up with pavement joints)
 - Unreinforced pavements 15 feet
 - Reinforced pavements 20 feet

Concrete pavement that cannot be placed by machine shall conform to the need for special joint spacing and design. Shrinkage reinforcement shall be required and minimum thicknesses will need to be increased.

5.2.3.7 Sidewalks

The Design/Builder shall follow these guidelines:

- Construct sidewalks with 5 feet minimum clear width.
- Include smooth, greased dowels to control vertical displacements at all construction and expansion joints.
- Do not use steel or welded-wire mesh reinforcing as a substitute for proper water-cement ratios and an appropriate flexural concrete design mix. Metal reinforcing shall be used.

5.2.3.8 Pavement Joints

The Design/Builder shall abide by these guidelines:

- Show, dimension, and detail concrete pavement joints carefully.
- Provide proper dowel joints at concrete-to-asphalt pavement transition.
- Slope individual concrete panels uniformly, in all directions, between construction joints.
- Place grade changes or “breaklines” at construction joints.

5.2.3.9 Butt-type Joints

The Design/Builder shall follow these procedures:

- Use butt-type construction joints with bondbreaker or preformed joint filler; joint sealant; and smooth, lubricated, steel dowels instead of formed shear keys.
- Avoid joint intersections with angles of less than 90 degrees, or “T intersections,” without load and stress transfer separation.
- Avoid stress transfer across joints separating concrete and asphalt pavements.

5.2.3.10 Soft Base and Unsuitable Material

Existing soft base and unsuitable materials encountered in the site shall be completely removed and replaced with commercially processed aggregates or other naturally occurring soil or base course materials.

5.2.3.11 Bus Turning Movements

Roadways and traffic areas must be designed to account for bus-turning movements without encroaching on oncoming traffic lanes.

5.2.3.12 Bus Size

The Design/Builder shall observe the following guidelines:

Standard Design Vehicle:	BUS-14 [BUS-45]
Maximum Width:	8.5 feet
Maximum Height:	13.5 feet

5.2.3.13 Horizontal Control/Geometry Plans

The drawing scale for the site plans shall be 1 inch = 30 feet, so all horizontal control geometric data, notes, and other information can be placed on the drawings. In preparing the plans the Design/Builder shall:

- Verify that any existing information (i.e., property lines) shown is accurate and complete.
- Locate all proposed structures by using coordinates.
- Show distances between all structures.
- Indicate coordinates to establish the location of all buildings and structures on the site plan with the project north coordinate written above the project east coordinate.
- Show a structure corner column line intersection and provide a coordinate to locate the intersecting column lines for new buildings or structures.

5.2.3.14 Vertical Controls/Finished Grades

Site finished grades define the finished ground and pavement configuration at the site area between the buildings or structures. The Design/Builder shall follow these guidelines:

- Make the drawing scale for grading plans 1 inch = 30 feet.
- Make finished grades at structures, slabs, and buildings a minimum of 6 inches below the finished floor or slab elevation, unless vehicular access is required.
- Incorporate contours with control points, grade changes, and establish "breaklines" to provide for intersecting planes in grading design.
- Locate control points for staking during construction by coordinates, or dimensions from permanent structures. Spot elevations and control lines without contours are not adequate.

- Direct sheet flow and flow lines away from areas of frequent pedestrian traffic (walkways) and yard activities.
- Provide culverts where collected drainage must cross walkways.
- Direct drainage away from structures and buildings and away from the top of cut-and-fill slopes.
- If required, design inlet structures so ponding does not occur and hinder the operation of the facility if drainage is collected into an underground system.
- If required, design surface-water overflow protection into any drainage area served by an underground pipe (storm drain). When the drain system is out of service, drainage will flow over berms and landscaped areas, which protect buildings and other water-sensitive structures from flooding.
- Set the overflow elevation at a minimum 6 inches below the floor elevations of the buildings.
- Use finished grade contours at 1-foot intervals to define drainage patterns in areas where roadway plans do not define the finished grades. All finished grade contours shall be straight, parallel lines that reflect precise uniform slopes between grade changes or “breaklines.”
- Show spot elevations at all grade changes, such as the beginning and ends of curves, ridges, and flowlines.
- Define the finished paved surfaces to an accuracy of 0.01 feet and unpaved areas, such as landscaping, lawns, and groundcover, to an accuracy of 0.05 feet.
- Define all pavement XYZ controls to an accuracy of 0.01 feet either by showing a specific spot XYZ control point or by showing vertical control elevations at defined horizontal control lines, such as roadway centerlines, curb lines, and back of sidewalk.
- Construct slopes as follows:

Uniform asphaltic concrete surfaces	1.00 percent minimum (perpendicular to finished contours)
Asphaltic concrete flowlines	0.75% minimum
Uniform concrete surfaces	0.80% minimum (perpendicular to finished contours)
Unpaved slopes such as lawns	2.00% minimum
Concrete flowlines	0.50% minimum
Grass slopes	4:1 desirable; 3:1 (Horizontal: Vertical) maximum

5.2.4 Yard Piping Plans

The drawing scale for yard piping plans shall be 1 inch = 30 feet. The Design/Builder must not show contours on this sheet. Show the storm drainage system on the grading plans only.

On outside piping plans, profiles, and sections clearly show the following:

- All grade changes
- Coordinates for all manholes, stubs, branches, fittings, and interfaces
- Invert elevations of all gravity lines and centerline elevations of all non-gravity lines
- Elevations of gravity and non-gravity lines at buildings, structures, and interfaces
- Each line size, system designation (e.g., SD, W1, and SAN), and direction of flow (where applicable)
- Buried piping and conduits to the outside face of the building or structure

If the number of manholes, stubs, branches, and interfaces shown on the same sheet makes it difficult to indicate project grid coordinates and elevations for each item, an XYZ table shall be prepared on a separate drawing. This table will display the location or interface number, north and east coordinates, invert and centerline elevations, and instructions.

Pipe bedding shall be shown on the drawings to suit soil conditions, pipe materials, and depth of cover.

Piping at structures shall conform to the following criteria:

- Piping shall be encased in concrete whenever under the structure and to a distance outside the structure determined by a 45 degree downward angle from the outside of the footing to the pipe.
- Immediately outside the structure or encasement, two flexible joints shall be provided on pipes leaving the structure to allow for differential settlement. This also applies to pipes connecting to structures. For pressure lines, the flexible joints shall have a mechanical restraint to prevent the joint from separating because of lateral thrust. For gravity lines, the flexible joints shall be the normal push-on joints. The first flexible joint shall be 2 feet from the structure, the manhole, or the end of the concrete encasement. The second flexible joint shall be approximately 5 feet from the first.
- If gravity lines with flexible push-on gasket joints connect to structures, the connection must be made with an adapter cast set into the structure to receive the pipe with the rubber-gasketed joint.

5.2.5 Storm Drainage Design and Analysis

5.2.5.1 Design Storm Runoff Determination

The Design/Builder shall comply with SFWMD and FDEP requirements and with Monroe County "Land Development Regulations".

Stormwater runoff "Qs" shall be determined by using the Rational Method.

$$Q = C I A$$

Where:

Q	=	Runoff in cubic feet per second (cfs)
C	=	Runoff coefficient ($C_w \times C_f$)
I	=	Rainfall intensity in inches per hour
A	=	Area in acres

The Design/Builder shall follow SFWMD *Design Manual* (latest edition) for design requirements.

5.2.5.2 Rainfall Duration/Intensities

Design storm rainfall intensities shall be determined from the *Rainfall Intensity-Duration-Frequency Curves ZONE 11*, developed by FDOT.

Times of concentration (T_c) shall be considered for both overland and pipe flow in determining intensities for calculating design Qs.

5.2.5.3 Design Storm Events

The Design/Builder shall follow SFWMD design guidelines.

<u>Location</u>	<u>Frequency of Occurrence</u>
Mainline Pipes	25 years
Catch Basins/Curb Inlets	25 years
Catch Basin/Curb Inlet Pipe Connections	25 years
Roof-Drain Pipe Connections	10 years

5.2.5.4 Pipe Capacity Design (If required)

The Design/Builder shall use the Manning's formula for determining pipe capacities and hydraulic and energy gradelines.

Minimum velocities for storm drains shall be 3.0 feet per second (fps) to promote self-cleaning. Minimum slopes, from a constructability standpoint, shall be 0.001 or 0.1 percent. Manning "n" of 0.013 for all sizes of reinforced concrete, concrete, ductile iron, and cast-iron pipe for determining pipe friction losses shall be used. Use "n" of 0.012 for high density polyethylene (HDPE) pipes. Grass and other flexible lined channels shall be designed according to Federal Highway Administration *Design of Roadside Channels with Flexible Linings* (HEC-15). Design procedures for flexible lined channels shall be based on the concept of maximum permissible tractive force. For culverts design, the Design/Builder shall use the FHWA *Hydraulic Design of Highway Culverts* (latest edition) HDS-5. All culverts shall have energy dissipaters at the outlet. Minimum pipe diameters shall be 15 inches.

5.2.5.5 Minor Head Losses

Minor head losses shall be taken into consideration in the hydraulic design. Pipes shall be designed to flow full without having the hydraulic grade line penetrate the finished grade. Surcharging catch basins and manholes are permissible if surcharging is limited to be at least 1 foot below the top of the structure under design flow.

5.2.5.6 Manholes

Manholes shall be at:

- All grade changes
- All alignment changes
- All pipe size changes
- Sewer dead ends for cleaning and flushing ease

5.2.5.7 Pipe Materials

The following pipe materials shall be used in storm sewers:

- Reinforced concrete pipe
- Corrugated metal pipe (temporary installations only)
- HDPE pipe

5.2.5.8 Pipe Joints

All pipe joints shall be watertight to exclude infiltration or exfiltration.

5.2.5.9 Pipe Trenches

Trench excavation shall be classified as common excavation—all material not classified as rock excavation.

Pipe bedding shall be 1-inch minus coarse aggregate for all pipes except HDPE pipes which shall be sand or selected sandy soil, all of which passes a No. 4 sieve and not more than 10 percent of which passes a No. 200 sieve and conforms to FDOT *Standard Specifications for Road and Bridge Construction* (latest edition). Trench backfill above the pipe zone shall be select granular base materials as defined by FDOT *Standard Specifications for Road and Bridge Construction* (latest edition).

5.2.5.10 Pipe Strength

The design procedure for selecting rigid pipe strength requires:

- Determination of earth load
- Determination of live load
- Selection of bedding class
- Determination of load factor
- Application of safety factor

Controlling trench width at the top of the storm sewer pipe shall be used to reduce pipe strength requirements. To calculate pipe strength (D-load) requirements for rigid pipes, American Concrete Pipe Association methods shall be used.

5.2.5.11 Supplementary Regulatory Requirements

Any drainage systems installed are required to be fitted with oil water separators. The site operations plan must include a corresponding procedure for keeping the oil water separator systems functioning as intended in compliance with the FDEP groundwater monitoring program for the project site.

5.2.6 Sanitary Sewers Design and Analysis

5.2.6.1 Site Sanitary Sewer

Sanitary sewers shall be constructed of material that is resistant to hydrogen sulfide corrosion. Appropriate linings or coatings shall be applied to structures, such as manholes and wetwells, likely to be in contact with hydrogen sulfide gas and/or subject to high turbulence.

All gravity pipe lines shall be at least 6 inch in diameter and have manholes to grade. Manholes shall be located at all changes in direction. In straight stretches of pipe, the distance between manholes shall be no more than 200 feet. Smaller pressure lines shall have pressure cleanouts at grade. These cleanouts shall be spaced at appropriate intervals to allow access.

Gravity sewers shall be designed for steady flow conditions to carry the design flow without surcharge when flowing full. The factors to consider in determining gravity system hydraulics include the design formula, roughness coefficient, velocity, and slope.

If sewers are designed at minimum grades for long distances that end in a manhole drop connection, the slopes shall be adjusted to make it steeper to avoid flat grade and drop connection. This will apply unless there are other design criteria involved.

All work, materials, shall be completed in conformance with the City of Key West Sewer Engineering Department requirements.

5.2.6.2 Sanitary Sewer System Ventilation

Sewer gases can be especially dangerous in places where personnel might not expect or be aware of a problem. Deep sewers often have oxygen deficiencies.

Sewer gases are also corrosive to most commonly used pipe materials. Discharge points where long pressure mains flow into gravity sewers are prime trouble spots. Hydrogen sulfide generated in full pressure mains will do the most damage in the discharge manhole and in the outlet gravity sewer a short distance from the manhole. Pressure mains should be kept as short as possible, with adequate air release valve locations to avoid hydrogen sulfide buildup.

5.2.6.3 Sanitary Sewer System Pipeline Design

Sanitary sewers shall be designed using Manning's equation, to flow partially full or full. Surcharging of manholes or structures shall not be permitted.

5.2.6.4 Roughness Coefficient

The value of “n” in the Manning formula is assumed to be constant for partially flowing or completely full pipes. An “n” value of 0.013 shall be used as an average coefficient for all sizes and types of sanitary sewer pipe.

5.2.6.5 Velocity and Slope

Sewer invert slopes are established using the following three criteria.

Cleansing Velocity

Minimum velocity under full-flow conditions is 2 fps to ensure an adequate cleansing velocity.

Minimum Slope

The minimum slope shall provide a 2 fps cleansing velocity. For sewers with minimal initial flows, consideration shall be given to designing for higher minimum velocities or providing methods for periodic flushing. The following minimum slopes shall be used only if absolutely necessary because of grade restrictions:

Sewer Size (inches)	Minimum Slope (feet/foot)
8	0.0040
10	0.0028
12	0.0022
15	0.0015
18	0.0012
21	0.0010
24	0.0010

Maximum Slope

If velocities are greater than 10 fps, special provision shall be made to protect against displacement or erosion. Design/Builder shall avoid this situation if possible.

5.2.6.6 Manhole Losses

Head loss within a manhole is caused by change of direction, size, and slope. When a sewer pipe joins another pipe with a larger diameter, the Design/Builder shall sufficiently lower the invert of the larger pipe to maintain the same energy gradient (no head loss). An approximate method is to place the 0.8-diameter depth point of both pipes at the same elevation. If the ratio of the smaller pipe to the larger pipe is equal or greater than 0.8, it is permissible to match crowns.

The Design/Builder can also match crowns when the downstream pipe size is greater than the upstream pipe size. If the depth is excessive or the available drop is at a premium, the loss may be calculated as the difference between upstream and downstream velocity heads ($\Delta v^2/2g$); however, the loss cannot be less than zero.

An invert drop is not needed when a manhole is inserted in a line without change in slope, flow, or direction.

Change in Direction

Where sanitary sewers of the same size, designed at a minimum gradient, have an angle of divergence greater than 30 degrees at manholes, a minimum drop of 3 inches shall be included for the downstream sewer. Wherever the velocity exceeds 4 fps, the drop shall be determined by the following formulae:

<u>Degrees</u>	<u>Loss</u>
90	$1.0 v^2/2g$
45	$0.3 v^2/2g$
30	$0.2 v^2/2g$

Where:

v = the downstream velocity.

Change in Slope: $0.3 (\Delta v^2/2g)$

Where:

$(\Delta v^2/2g)$ = Difference between upstream and downstream velocity heads. This difference cannot be less than zero.

Materials

PVC should be used for 6 to 18 inches diameter pipe. Reinforced concrete pipe should be used for larger diameters. Metallic piping shall not be used for underground piping applications. Underground Utility Marking Tape shall be installed over non-metallic pipes.

Joints should be designed to minimize leakage and root damage. Maximum allowable infiltration shall not exceed 200 gallons per inch of pipe diameter per mile of sewer per 24 hours.

5.2.6.7 Sanitary Sewer Manholes

When designing and constructing manholes, the Design/Builder shall:

- Install manholes at all connection points and where the sewer changes horizontal alignment, slope, or pipe size.
- Space manholes no more than 200 feet apart.
- Construct manholes of precast or cast-in-place concrete. If buried deeper than 10 feet, precast sections shall be joined with flexible gasket joints for watertight installation.
- Include watertight gaskets in pipe/manhole connections.
- Core drill pipe connections to existing manholes. A synthetic-rubber link seal should be installed to maintain water tightness.
- Check and design manholes for possible structure flotation.
- Do not construct manholes of brick or masonry.
- Size the interior of standard manhole barrels at 48 inches minimum, but size will depend on the number of pipes and largest pipe diameter connecting to the manhole.
- Design manhole frames and covers for applicable wheel loadings.
- Design other manhole features as follows:

- Manhole bases – cast-in-place or precast.
- Cone sections – eccentric, with the vertical side oriented to provide the best access for steps or ladders.
- Flat slab manhole tops – use only where necessary, such as extremely shallow manholes.
- Manhole landings – use grated platforms for all manholes over 20 feet deep. Space equally between rim and invert. Maximum distance between platforms is 20 feet and should conform to current OSHA Standards.
- Manhole steps – location and spacing shall conform to current OSHA standards. Manholes deeper than 4 feet shall have steps. Aluminum steps will not be permitted. Steps shall be copolymer polypropylene plastic with steel reinforcement.
- Pipe connections to manholes shall only be via a boot system.

5.2.6.8 Outside Drop Manholes

Drop connections shall be used for connections if the invert elevation of the entering sewer is 24 inches or more above the spring line of the outgoing sewer.

5.2.7 Site Pressure Pipe Systems

General Information

The major factors to consider in analyzing pressure system hydraulics include the design formula, roughness coefficient, velocity, pressure surges, and maintenance.

Domestic and Utility Water

The Design/Builder shall follow the rules, regulations, and design standards of Florida Keys Aqueduct Authority and City of Key West for the design. The water system shall be designed as a loop to minimize dead ends, increase reliability, and reduce the size of piping. Isolation valves shall be provided at all tee fittings (one on each downstream pipe).

Potable water lines and sewer lines shall be separated at least 10 feet horizontally. When water and sewer lines cross then minimum vertical clearance shall be 1 foot vertically with the sewer lines always lower than water lines. If 10 feet of separation cannot be provided, special piping and encasement requirements shall conform to the applicable requirements.

Fire Protection Water System

Facility fire protection shall be connected to a piping loop provided around the perimeter of the facility. The system shall be able to provide a minimum of 1,500 gallons per minute (gpm) at a residual pressure of 20 psi throughout the system. **This project will require a fire pump station to provide adequate fire flow demand for the project.** Actual flow requirements shall be confirmed with the local fire department. This system shall meet the following criteria:

- Design velocities should not exceed 8 fps.
- Fire hydrants shall be per FKAA standards and other applicable fire codes.
- Fire hydrant spacing shall conform to the rules and ordinances of the local fire department. As a general rule, a fire hydrant provides a 250-foot radius coverage for structures. A fire hydrant

shall be located no more than 150 feet from any fire department connection to the building fire sprinkler system.

- Fire hydrants shall be placed near cross streets and roads with fire truck access. Fire hydrants should be placed so when a pump truck is parked next to a hydrant, the truck does not block access to the remaining portion of the site. Hydrants should be readily visible to fire department personnel.
- Because fire hydrants are vulnerable to vehicular damage, they shall be provided with crash posts.
- All fire hydrants shall have an isolation valve between the loop/main tee and the hydrant.

Design Formula: Use the Hazen-Williams formula for design.

Roughness Coefficient

The roughness coefficient varies with the pipe material, size, and age. The following Hazen-Williams pipe roughness coefficients (C-factors) shall be used in the design of pressure piping systems:

<u>Material</u>	<u>C-Factor</u>
	HDPE 120
PVC	120
Concrete cylinder pipe	100

Velocity

The minimum velocity shall be 3 fps. Dual-pressure mains may be needed to obtain the required velocities for both initial and ultimate design flow conditions. Dual-pressure mains often can be installed in two stages.

Pressure Surges: See Section 6.5, Mechanical Technical Requirements.

Thrust Restraints

Unbalanced forces in pressure mains require that some form of physical restraint be applied to the piping system. The methods generally used to achieve adequate restraint are the following:

- Thrust blocks
- Restrained joints
- Tie rods
- Combined systems and structural connections

Within the site, only restrained joints are permitted. For offsites, gravity-type thrust blocks should be used for vertical anchorage, and bearing-type thrust blocks for horizontal alignment.

All pumped lines shall be restrained. All other piping shall be evaluated and restrained as necessary.

Pipe manufacturer's design data also include the recommended practice for all types of anchorage systems.

Low-Point Drainage and Air-Release Valves

Drains shall be installed at low points in the pipe. Air-release/vacuum valves shall be installed at high points (e.g., automatic valves for clean water and manual and automatic valves for raw wastewater and sludge).

Structural Design of Conduits, Pipes, Trenches, and Beddings

Conduit to be installed by open-cut construction shall be designed both for the normal trench width and for unlimited trench conditions where applicable. The pipe section and trench width shall be shown on the plans.

External Loads

All conduit designs shall consider loads imposed on pipe by the weight of the earth (dead loads) and any superimposed static and moving loads.

Method of Analysis

The method of structural analysis used shall be consistent with the allowable construction procedures for each project. The three most common conditions to be considered are trenches in natural ground, embankment conditions, and tunnels. Marston's theory is recommended to calculate vertical load on buried conduits from gravity. The Boussinesq formula is recommended for computing live loads on conduits.

Dead Loads

Dead loads for conduits to be constructed in open cuts shall be computed by using the normal trench width at the top of the pipe, or by the positive projecting conduit formula, whichever gives the least load on the pipe.

Pipe Bedding

Pipe bedding shall be sand, gravelly sand, or 1-inch minus crushed limestone, not more than 10 percent of which passes a No. 200 sieve.

Allowable Loads on Rigid Conduit

Rigid conduits are selected on the basis of the actual loads that will be applied and the safe supporting strength of a particular type of rigid conduit.

Safe supporting strength is expressed as:

$$[\text{three-edge bearing strength (ultimate)} \times \text{load factor}] / [\text{factor of safety}]$$

Three-edge bearing strength (ultimate) is a laboratory test strength described in American Society for Testing and Materials specifications.

Load Factor

Load factor is the strength ratio of a pipe under field loading and bedding conditions to its strength, as measured by the three-edge bearing test. Bedding is a primary design parameter.

Primary classes of pipe bedding load factors vary from 1.5 to 5.0. The general classes of bedding installations are described and illustrated in Chapter 9 of American Society of Civil Engineers Manual No. 37. Load factors for each of the basic classes are as follows:

<u>Bedding Classification</u>	<u>Load Factor</u>
A. Concrete Envelope or Arch	3.5 to 5.0
A. Concrete Cradle	2.2 to 3.4

B. Shaped Bottom with Granular Bedding	1.9
C. Ordinary Bedding	1.5
D. Flat Bottom	Not permitted

Safety Factor

A factor of safety of at least 1.5 based on ultimate strength shall be used for all rigid conduit.

5.2.8 Erosion and Sedimentation Control Plans

The Design/Builder shall fulfill all requirements for soil erosion and sedimentation control according to SFWMD and FDEP. The soil erosion and sedimentation control plans shall be at 1 inch = 30 feet scale. All soil erosion and sedimentation control measures used in the project shall be detailed in a separate drawing.

5.2.9 Landscape Plans

The Design/Builder shall comply with City of Key West Code of Ordinance. The Design/Builder shall refer to and substantially comply with approved City of Key West Major Development Permit and approved City of Key West Tree Commission plans. The Design/Builder will be responsible for any modifications to approvals obtained.

The drawing scale for landscape plans should be 1 inch = 30 feet. On landscaping plans, indicate all proposed landforms, elevations, type of cover (i.e., trees, shrubs, and grasses), finished contours, roadways, sidewalks, and retaining walls. The Design/Builder shall indicate the limit of work. All unpaved areas shall include topsoil and grass or native/adapted ground cover. Trees and shrubs should be limited so as not to interfere with underground utilities.

If additional detail is necessary to clarify the landscaping layout adjacent to buildings and structures, the Design/Builder shall provide detailed landscape plans drawn at 1 inch = 30 feet for the following areas:

- Areas adjacent to buildings and structures where sudden grade changes occur because of structural elements (e.g., stairs, ramps, and retaining walls).
- Areas adjacent to buildings and structures where the grade is flat and additional detail is required to clarify how the area is to drain.

5.3 Architectural

5.3.1 Regulatory Requirements

See Section 5.1.1 Regulatory Requirements for applicable codes and standards.

5.3.1.1 Building Code Data

A code search shall be conducted for this project, and the building code data shall be provided on the drawings. The code data shall be located within the General Sheets, or may be located elsewhere provided a note is given on the first floor plan stating the location of the code data by drawing number.

Each building shall be designed to meet the requirements of the Florida Building Code and the statement of code research for each building shall include:

- | | |
|---|---|
| A. Occupancy Group Classification: | List each separate occupancy group required by the program |
| B. Proposed Type of Construction: | List as appropriate |
| C. Allowable Building Height: | List as appropriate |
| D. Proposed Building Height: (feet) | List as appropriate |
| D. Allowable Building Area: (GSF) | List as appropriate |
| E. Proposed Building Area: (GSF) | List as appropriate |
| F. Building Occupancy: | As calculated by floor area divided by square foot rate for each identified yielding number of people |
| G. Design Building Occupancy: | Statement of actual anticipated occupancy based on client input. |
| H. Maximum allowable travel distance (feet): | List required distance |
| I. Proposed maximum allowable travel distance (feet): | List required distance |
| J. Fire Suppression System: | List requirements |
| K. Smoke/Fire Retention System: | List requirements |
| L. Statement of fire rated walls/partitions | Show location on plans and state UL# for the rated assembly with written or graphic description |
| M. Fire separation ratings | Indicate required separation ratings and locations; indicate UL# if applicable. |
| N. Fire Hydrant Protection | List requirements |
| O. Fire Extinguishers | List requirements |

5.3.1.2 Accessibility Code Design Requirements

The drawings and specifications will reflect required wheelchair turning radii, mounting heights of fixtures and permanent accessories, and fixture, doors and other required clearances as required by the Florida Accessibility Code. See Section 5.3.4.

5.3.1.3 Opening Positive and Negative Design Pressures

All openings, including but not limited to egress doors, overhead doors with hardware, louvers, vents and windows, will be required to be certified assemblies meeting the requirements of the Florida Building Code with respect to designer calculated positive and negative wind pressures and small and large missile impact. The pressure calculations will be based on the 150 miles per hour wind speed, 1.15 safety factor, and the exposure of the particular building where the opening is located. Refer to the Structural Technical Requirements (Section 6.4) for further information.

The positive and negative wind pressures shall be scheduled in the specifications or drawings, as required by the Florida Building Code.

5.3.2 Design Documentation

5.3.2.1 General Drawings Required

General drawings must include the following:

- Architecture legend
- Building code data and other regulatory requirements
- List of acronyms and abbreviations used
- Notes providing directions regarding critical areas not adequately defined in the drawings

The drawings shall be sufficiently detailed to identify and clarify symbols and line work.

5.3.2.2 Architectural Drawing Organization

The drawings shall be organized as follows:

- Drawings shall be organized by Building.
- The drawing scale shall be appropriate for the type of drawing. Floor plans shall not be less than 1/8 inch = 1 foot - 0 inches.

Architectural drawings shall be organized as follows for each building:

- Floor Plan(s)
- Reflected Ceiling Plans, as applicable
- Roof Plan
- Elevations
- Building Sections
- Wall Sections
- Enlarged Plans, as applicable
- Interior Elevations, as applicable

- Details
- Schedules

Each building drawing is to be sealed and certified by a licensed Florida architect/engineer.

5.3.2.3 Typical Construction Details

Typical construction details shall be developed as per the proposed project design.

Details shall include, but not be limited to, eave condition, gutters, doors, windows, overhead doors, louvers, roof drains, concrete wall to metal wall panel transitions, casework, partition types, and fire rated assemblies.

5.3.3 Visual Image Policies and Guidelines

5.3.3.1 Architectural Elements

The architectural design standards shall provide design unity throughout the facilities. The individuality of each facility shall be expressed in form or mass, with continuity achieved through the use of scale, color, texture, material, and detail. The following design standards apply to all structures:

- Design architectural elements with crisp, clean lines, and reflect the scale proportions and contextual quality of existing buildings.
- Buildings that are larger than adjacent structures shall introduce an architectural element that relates to the smaller building.

5.3.3.2 Colors

Exterior color shall provide continuity throughout the facility. Following the guidelines below will assist in creating a harmonious environment:

- Enhance the visual harmony of the site by selecting neutral colors for the surfaces of the main buildings.
- Incorporate color consistency of elements into every design to create design unity.
- Use dark and light tones to emphasize form, with darker tones tending to screen features and lighter tones tending to highlight them.
- Select colors to coordinate and accentuate existing color schemes.
- Submit proposed color selections to CITY for review and approval.

5.3.3.3 Materials

These guidelines shall be followed for selecting materials:

- All materials shall be judiciously selected with regard to recycled content, recyclability, regional availability, efficiency of use, low-emissivity, and minimal waste generation. Refer to the LEED Reference Guide for additional guidance.
- Materials and interior finishes shall be used to complement the overall design.
- The primary building materials will be steel and reinforced concrete.
- All materials and assemblies required to meet the hurricane and impact requirements of the Florida Building Code shall have supporting documentation of compliance.
- The steel members, components, and cladding exposed to the atmosphere are to have the appropriate factory or paint finish for the salt environment of the Keys.
- Roofing will be standing seam metal panels, pre-finished to resist salt environment conditions.
- Use corrosion-resistant metals in architectural details, such as frames, railings, fixtures, and other components, which are complementary to other features within the facilities.
- All exterior exposed concrete masonry unit (CMU) and concrete building surfaces are to be stained and sealed.
- Concrete colors shall be integral to the material itself. Additional coating shall not be necessary unless required for performance specific criteria.
- Materials and color finish presentation boards to be submitted for Owner/City review and acceptance.

5.3.3.4 Interior Room Finishes

The following information shall provide guidance for the selection of interior finishes. The final finishes shall be determined according to the specific building criteria, and as approved by the Owner.

- Light interior areas naturally wherever possible. To enhance brightness, interior surfaces shall be light colored with appropriate light reflectance values.
- Provide a finish surface to all interior spaces; no surface area shall be left untreated.
- Use cementitious backer board or glass reinforced tile backer board for all wall areas receiving porcelain or ceramic tile.
- All spaces which are air conditioned or heated but are not scheduled for special wall finishes shall have 5/8" gypsum board, taped, spackled, and painted with satin or semi-gloss finish.
- Paint or seal exposed concrete surfaces as required.

- Acoustical lay-in ceiling shall be a humidity, mold, and mildew resistant product having a reflectance and sound absorption rating appropriate for office and conference room use.
- All interior finish materials shall conform to the guidelines of the LEED Reference Guide.
- Final selection of interior finishes shall be subject to review and approval by Owner.

5.3.4 Accommodations for Accessibility

The construction of public buildings or facilities shall incorporate features to assure safe and ready access for use by those with physical limitations. The ADA introduces many definitions and checklists that are open to interpretation and have not been tested in court. The designer shall use sound professional judgment when considering accessibility. The following summarizes the major areas where accessibility standards will affect the design of facilities, however, is not all inclusive. It is the responsibility of the D/B to ensure through coordination and adherence to all applicable regulatory requirements.

5.3.4.1 Site

New construction shall have a minimum of one accessible route from parking areas, streets, and sidewalks to each accessible building entrance, on the shortest route possible. Additional accessible routes shall be provided as appropriate and as required by code.

5.3.4.2 New Buildings

Accessibility will not be provided where building functions would create a hazardous condition for persons with limited mobility, providing that the code enforcement officer agrees with the Design/Builder architect's interpretation. Otherwise, an accessible route shall be provided connecting all accessible spaces within a building.

5.3.4.3 Required Features in Accessible Building Areas

Building Entrances

In new construction, all entrances for egress required by local building and fire codes shall be accessible, and at least 50 percent of all public entrances shall be accessible. At each accessible entrance, at least one door shall be accessible.

Accessible Route

This route shall, to the extent possible, coincide with the route of the general public and staff, where not prohibited by safety regulations, connecting all accessible spaces and features. The route's clear minimum width shall be 36 inches, with passing spaces of at least 60 inches by 60 inches. If the accessible route is less than 60 inches wide, there shall be a tee intersection every 200 feet.

Ramps

Ramps shall be used as required for elevation changes within the route of travel. Ramps must not exceed a slope of 1:12, with a rise no greater than 30 inches in any run. Handrails and guardrails shall be provided as required by FBC and ADA guidelines.

Doors

There shall be an accessible door for each accessible route, space, and entrance and exit. Doorways shall have a minimum clear opening of 32 inches with the door open 90 degrees.

Pressure exerted to open doors shall be as required by code and all doors shall have lever handles unless they are required to have panic hardware.

Means of Egress

The number of exits required by local building and fire codes shall be accessible.

Drinking Fountains

Drinking fountains shall be provided in the Administration Building: one accessible to individuals who use wheelchairs, and one accessible to individuals who have difficulty bending and stooping.

Toilet Facilities

At least one single user toilet room per floor shall be designated as unisex and shall be accessible. In multiple-user toilet rooms, at least one stall with toilet and lavatory shall be accessible. Where shower facilities are provided, at least one unisex (or one per gender) shower shall be accessible in conformance with ADA guidelines.

Controls

In accessible spaces, all controls (e.g., light switches, dispensers, etc.) shall be accessible.

Emergency Warning Systems

Both audible and visual alarms shall be provided.

Building Signage

Permanent room signage and directional signage shall conform to required graphic size ratios, with raised letters, Braille, and pictograms, on a non-glare finish that contrasts with the background. These signs shall be mounted 60 inches to centerline above the floor.

Dressing Rooms

If dressing rooms are provided for employees or the public, 5 percent of those (or at least one in each cluster) shall be accessible. A 24-inch deep by 48 inch wide bench must be designed as part of the locker room in the Administration Building.

Public Telephones

If public pay telephones, public closed circuit telephones, or other public telephones are provided, at least one unit per floor shall be accessible and shall be equipped with a volume control. If two or more banks are provided per floor at least one telephone per bank shall be accessible.

5.3.5 Exterior Walls

5.3.5.1 Materials

The structures shall be of non-combustible materials. Exterior material shall be predominately concrete masonry units, cast-in-place concrete and metal panels and trim.

5.3.5.2 Finish

Concrete walls shall be stained and sealed. If waterproofing is required according to the space use, sealants or water repellents (in compliance with LEED Reference Guide for the interior side) shall be provided. Concrete walls shall be protected against moisture penetration above grade by means such as adequately filled compressed joints; lintel and sill flashing; flashing or weather break offsets at spandrels; and overlapping weather breaks where masonry abuts columns and beams.

5.3.5.3 Drainage

Roof decks shall be designed to shed water and as per manufacturer's recommendations. Gutters and downspouts must be provided and coordinated with civil design and plumbing design.

5.3.6 Hurricane and Impact Assemblies

All openings including windows, louvers, egress doors and overhead doors will be required to be certified assemblies for the pressures calculated and for small and large impact, including the door hardware. The exterior cladding of all the buildings must also be able to withstand wind pressures and small missile impact. The assembly will meet the requirements of the Florida Building Code with respect to wind pressures and small and large missile impact and Owner shall be provided with documentation. A Miami-Dade Notice of Acceptance (NOA) number may be used if the proposed assembly is exactly the NOA.

5.3.7 Doors

5.3.7.1 General

Doors shall be protected from weather as much as possible. All exterior doors must include weather stripping, including door shoe and rain drip at head. The floor on both sides of every door shall slope no more than ¼ inch per foot every 5 feet. Door thresholds shall not exceed ¼ inch high (maximum per Florida Building Code, Accessibility Chapter 11.)

5.3.7.2 Size

Standard-sized doors shall be used if possible. Single-exit doors shall be a minimum of 3 feet wide by 7 feet 0 inches high, and shall swing outward in the direction of egress.

5.3.7.3 Number of Exits

Every building and every floor level shall have at least two exits, separated in accordance with egress requirements.

5.3.7.4 Signs

Every exit door shall be marked by an illuminated sign that conforms to fire and ADA codes.

5.3.7.5 Locks/Hinges

All lock cylinders shall receive seven-pin cores. Hinges shall be stainless steel for exterior doors. Hinges shall be NRP (non-removable pins) at exterior or secured locations.

5.3.7.6 Special Doors-Overhead Coiling Doors

Coiling overhead aluminum doors with factory Kynar 500 finish and motors shall be specified, providing they meet the Florida Building Code with respect to wind pressures and small and large missile impact. Owner shall be provided with documentation. Provide concrete sill detail, which will inhibit rainwater intrusion and air/wind into building under doors when in closed position.

5.3.8 Windows

Windows shall be placed so that natural light enters the building. Impact resistant, low-e glazing is to be used in exterior applications. Windows shall be provided with a minimum sill height of 36 inches above finished floor. If the windows are proposed to be operable, insect screens shall be provided. The windows shall be provided with interior 1-inch blade horizontal aluminum blinds.

5.3.9 Louvers

Louvers shall be aluminum, with a factory-applied, baked enamel finish, with bird screens. The designer must address louvers in terms of whether the structural design is based on an enclosed building or a partially enclosed building, as this will affect selection of the louvers, possibly requiring automatic dampers.

5.3.10 Stairways

5.3.10.1 Width

All stairways must be a minimum of 4 feet 0 inches clear width. Handrails and guardrail design and mounting heights shall be as per the Florida Building and ADA Codes. Egress stairs to have solid treads and risers, and enclosed in a rated enclosure.

5.3.10.2 Rise and Run

Risers shall be no higher than 7 inches, and the tread depth no less than 11 inches. The tread dimensions do not include stair nosings. The vertical rise between stair landings shall be less than 12 feet.

5.3.10.3 Materials

Materials used to construct stairs shall be of cast-in-place concrete or concrete-filled metal pan construction.

5.3.10.4 Application

Concrete stairs should be used inside in areas where a large amount of washdown water normally is present or in areas subject to frequent spills or corrosion.

Egress stairs may not have open risers.

5.3.10.5 Code Compliance

See Florida Building Code and other applicable codes for additional stairway requirements including, but not limited to Areas of Refuge. Special attention is to be given to the provisions of the Florida Accessibility Code/ADA.

5.3.11 Elevator

Elevator shall be holeless, hydraulic type with 100 fpm speed. Allow pit depth minimum of four feet. Allow adequate clear space overhead to hoist beam per manufacturer's recommendations. Size machine room per manufacturer's recommendations (approximately six by eight feet.) Floors shall be slip-resistant. Elevators must comply with all applicable local ordinances, state and federal regulations. Elevators must also comply with applicable ADA requirements, including but not limited to, controls, clear space, signals and timing.

5.3.12 Ramps

Ramps shall have a slip-resistant surface.

5.3.12.1 Width

Ramps shall be no less than 4 feet 0 inches wide.

5.3.12.2 Ramp Slope

Ramps shall have a maximum slope of 1 foot of rise in 12 feet of run, and shall have 5-foot minimum, level landings at each end. The rise of each ramp section shall not exceed 2 feet 6 inches.

5.3.12.3 Code Compliance

See Florida Building Code and other applicable codes for additional ramp requirements. Special attention is to be given to the provisions of the Florida Accessibility Code/ADA.

5.3.13 Railings and Guards

5.3.13.1 Application

All stairways of more than three risers shall have handrails. All ramps with a rise exceeding 6 inches, or a length exceeding 6 feet, shall have handrails on both sides.

Open sides of stairways, landings and ramps shall have a guardrail. On level walking surfaces more than 30 inches above the floor or grade below, and elsewhere as required, railing guards shall be provided.

5.3.13.2 Design

Railings shall be constructed of aluminum and shall meet ADA requirements.

On stairways or ramps, handrails shall be 34 inches high, measured vertically above the nosing of the stair treads or from the ramp. Railings shall extend at least 12 inches beyond the top riser and 12 inches plus one tread width at the bottom risers.

Guardrails shall be 42 inches high and shall be constructed to comply with opening limitations in the Florida Building Code, depending on location. Typical industrial railing for non-public areas shall be three-horizontal rail design. Public access areas shall have vertical rails constructed to prevent passage of a sphere with a diameter of 4 inches.

Toe boards at least 4 inches high shall be used along exposed edges of all elevated platforms, walks, balconies, mezzanines, and ramps to prevent materials from falling.

5.3.14 Toilet Rooms

The Administration Building shall have at least two unisex toilets and two shower rooms. See Section 5.3.4 for accessibility requirements.

5.3.15 Acoustics

During building design, designers shall consider the level of noise moving between spaces (i.e., Service Bays, Training Rooms, Locker Room, etc.) Placement of openings, wall construction, and distance to adjacent spaces affects noise control decisions.

The following methods of noise abatement shall be considered for the Administration/Operations and Bus Maintenance spaces:

<u>Item</u>	<u>Area Used</u>
Acoustical CMU	Should be the primary noise-reduction method for CMU construction
Suspended Acoustical Ceiling Tile	Interior rooms (not conducive to areas where piping and conduit are suspended and require routine access)
Acoustical Sound Attenuation Batt	Installed full thickness between drywall within metal stud partitions

5.4 Structural

5.4.1 Overview

The purpose of these instructions is to provide a uniform, efficient, and effective approach to the structural design for the Key West Public Transportation Facility (PTF.)

Computations for each structure must begin with a summary of the design criteria, dead, live, and wind loadings, materials, ground water conditions, allowable foundation pressures, and hydrostatic loadings. Tops of all calculation sheets are to be completely filled out with the date, designer's name, project number, sheet numbers, and project and structure name. At the end of the project, turn in all calculations to the lead structural engineer.

Detailing will utilize Standard Details and Standard Specifications. Details will be modified by the lead structural engineer and copies distributed to the designers for their information and feedback. Detailing of structures is to be complete, showing all features of construction. Dimensioning should be complete; however, repetition of dimensions on drawings is to be avoided.

5.4.2 Codes and Standards

In addition to requirements listed in Section 5.1.1 Regulatory Requirements, the Structural design shall comply with the applicable codes, standards and recommended practices of the following:

1. Reinforced Concrete:
 - a. ACI 318 for buildings and non-waterholding structures
 - b. ACI 350 for waterholding structures
2. Masonry: ACI 530
3. Steel:
 - a. AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings
 - b. AISC Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts
 - c. AWS Structural Welding Code AWS D1.1
AISC Manual of Steel Construction, Current Edition
AISC Manual of Steel Construction, LRFD, Current Edition
4. Aluminum: Aluminum Association Specifications for Aluminum Structures
5. Steel Bar Joists: Steel Joist Institute Standard Specifications
6. Metal Deck: AISI Specifications for the Design of Light-gauge, Cold-formed Steel Structural Members
7. Light Gauge Metal Framing: AISI Specifications for the Design of Light-gauge, Cold-formed Steel Structural Members

8. Metal Grating: National Association of Architectural Metal Manufacturers Metal Grating Manual and Heavy Duty Metal Grating Manual
9. Fiberglass: Extren Glass Reinforced Structural Engineering Manual, Morrison Molded Fiber Glass Company
10. Wood:
 - a. National Design Specifications for Wood Construction
 - b. Design Values for Wood Construction
 - c. AITC Timber Construction Manual
11. ASCE 7, Minimum Design Loads for Buildings and Other Structures

5.4.3 Design Loads

In some cases, the minimum loads listed in ASCE 7 may be considered equivalent criteria and may be substituted for the following loads.

Floor Live Loads: In accordance with the Building Codes listed above and the following minimums:

Service Bays	300 psf
Electrical Rooms	100 psf
Storage Areas	100 psf
Mech/HVAC Rooms	150 psf

or

Equipment weight plus 50 psf. Allow for rolling equipment out.

General Loads

Administration Areas	50 psf
Stairs, Walkways, and Platforms	100 psf
Vehicular Traffic	AASHTO HS 20-44

Roof Live Loads

These loads should be in accordance with the Florida Building Code. The minimum roof live load shall be 20 psf. Increase loads as required assuming primary drains plugged and water at the overflow elevation.

Roof Collateral Load

10 psf plus operating weight from any roof mounted equipment.

Wind Loads

150 mph in accordance with the Building Codes listed above, including current Florida Building Code and ASCE 7. Exposure C, Importance 1.15

Positive and negative wind pressures shall be calculated for every opening on the buildings and stated on the drawings. This includes louvers, windows, and all doors.

Rain Loads

Increase loads as required assuming primary drains plugged and water at the overflow elevation.

Special Dead Loads

20 psf on floors with partition walls.

Cranes and Monorails

Shall meet all AISC Steel Construction Manual requirements, impact shall be 25 percent of the rated hoist capacity. Runway horizontal forces shall be designed per AISC Steel Construction Manual requirements.

Earth Pressures

In accordance with the recommendations in the Final Geotechnical Report prepared by the Design/Builder for the proposed project and the criteria herein.

Stability Analysis

A stability factor of 1.5 shall be used to resist overturning and sliding. The sliding coefficient of friction is 0.30. A safety factor of 1.1 shall be used to resist uplift of the structure weight and 1.5 when including the weight of soil on the footing toe. All safety factors are against unfactored soil loadings. The uplift pressure shall be taken at the bottom of the foundation. Side friction shall not be included in uplift resistance calculations unless there are significant cost implications and a higher safety factor is used.

5.4.4 Deflections

Limit deflections to the following maximum values. Deflections are due to live load only unless specifically indicated otherwise.

Steel floor plates and grating:	L/360
Beams, lintels or slabs supporting masonry:	L/720 (3/8 inch maximum for lintels over windows)
Roofs (check ponding):	
Without ceilings:	L/240
With ceilings:	L/360
Floors:	
Steel:	L/360
Concrete:	See ACI 318 for short and long term limitations for dead and live load deflections
Wood (Dead plus Live Load):	L/360

5.4.5 Concrete Design

5.4.5.1 Materials

- Cast-in-place structural concrete will have a minimum compressive strength of 4,000 psi
- Reinforcing steel will be grade 60 for all reinforcing.
- Prestressed, precast concrete will have a minimum compressive strength of 5,000 psi at 28 days. The prestressing tendons will be ASTM A416, Grade 270.

5.4.5.2 Design Procedures

- Working Stress Method will be used for the service bays and any containment areas.
- Allowable stresses shall conform to ACI 350.
- Ultimate strength design procedures, in accordance with ACI 318, may be used at the designer's option for above grade portions of buildings not subjected to damp or corrosive environments.

5.4.5.3 Details of Reinforcing

- Minimum concrete cover:

Service Bays top surface	3 inches
Formed concrete against earth	3 inches
Unformed concrete against earth	3 inches
Liquid or exterior face, wall	3 inches
Exterior, liquid face of slabs	3 inches

- | | |
|------------------------------|--------------|
| Exterior, dry face of slabs | 2 inches |
| • Interior, dry face, walls: | |
| #3-#5 | 1-1/2 inches |
| #6-#11 | 2 inches |
| • Interior, dry face, slabs: | |
| #3-#5 | 1 inch |
| #6-#11 | 1-1/2 inches |
| Ties and stirrups | 1-1/2 inches |
- Laps and hooks shall conform to ACI 318.
 - Minimum temperature and shrinkage reinforcing shall be provided to maintain minimum crack width ($z=95$).

5.4.6 Masonry

5.4.6.1 Materials

- Hollow concrete masonry units will be ASTM C 90, Grade N, Type I, normal weight. Use masonry lintels.
- Mortar will conform to ASTM C 270, Type S.
- Grout will conform to ASTM C 476. Minimum compressive strength will be 2,000 psi.
- Reinforcing will be grade 60.

5.4.6.2 Design Procedures

- Design as partially reinforced masonry in accordance with ACI 530.
- F'm will be 1,500 psi and N will be 13 for the masonry.
- Verify that the neutral axis of wall sections in bending falls in the face shell of the masonry.

5.4.6.3 Details of Reinforcing

- Limit maximum spacing of vertical reinforcing in bearing walls and partition walls to 6 feet and 8 feet respectively.
- Provide bond beams at the top and bottom of walls and above and below intermediate floors. Do not use intermediate bond beams without discussing reasons with the lead structural engineer.
- Use joint reinforcing at 16 inch maximum vertical spacing.

5.4.7 Structural Steel

5.4.7.1 Material

	<u>ASTM</u>	<u>Fy(ksi)</u>
Rolled members, plates, and rods	A 36	36
Wide Flange shapes	A992	50
Steel pipe	A 501 or A 53, Type E or S, Grade B	35
Steel tubes	A 500, Grade B	46
Bolts for connections	A 325-N	
Anchor Bolts, dry areas only	A 316, stainless steel	
Welding electrodes	E70XX	

5.4.7.2 Design Procedures

- Design in accordance with AISC and AWS
- Use bolted framing connections for beams
- Assume unshored conditions when designing composite beams

5.4.8 Aluminum

5.4.8.1 Materials

	<u>ASTM Specification</u>
Aluminum Shapes and Plates	Alloy 6061-T6 conforming to the ASTM sections in the Aluminum Association Construction Manuals
Handrails	Conform to the requirements of CH2M HILL's standard specifications
Bolts	A 193, Type 316. Do not use aluminum bolts.

5.4.8.2 Design Procedures

- Designs will conform to the requirements of the Aluminum Association
- Verify the availability of all aluminum shapes shown on the drawings

5.4.9 Bar Joists

5.4.9.1 Design Procedures

- Design in accordance with SJI
- Use K Series joists where possible
- Use welded end connections on steel beams. Weld joists to steel base plates and bolt base plate to wall for CMU and concrete connections.

5.4.10 Metal Deck

5.4.10.1 Materials

- Metal deck will be an SDI wide rib type, minimum 22 gauge. Metal will conform to ASTM A 446, A 570 or A 611 with minimum yield strength of 33 ksi. All metal decks will have a G90 galvanizing in accordance with ASTM A 525.
- Sheet metal screws will be case hardened and tempered and will conform to AISI 1022. Screws will be zinc and chromate treated.

5.4.10.2 Design Procedures

- Design roof and floor decks for continuous, three span conditions
- Side seams of decks will be connected with sheet metal screws such as Tek Screws. Connections to roof framing and wall angles will be with 5/8 inch puddle welds. Use welding washers for 22 gauge deck.
- Diaphragms will be designed in accordance with SDI procedures
- List the required deck gauge thickness, minimum section modulus and moment of inertia, and welding and screw size and spacing requirements in the building notes for each building

5.4.11 Wood

5.4.11.1 Materials

1. Wood for use as nailers and bucks only.
2. Lumber will be Southern Pine No. 2, 19 percent moisture content.
3. Pressure treating will conform to AWPA C2 and AWPB LP-2 or AWPB LP-3.
4. Fire-retardant will conform to AWPA C20.
5. Nails will be steel common nails, galvanized where exposed.
6. Bolts and screws will conform to ASTM A 307, galvanized where exposed.
7. Framing anchors and hangers will be galvanized steel, 18 gauge minimum thickness as manufactured by Simpson, Teco, or Bowman.
8. Consider use of FSC (Forest Stewardship Council) certified wood where available and cost effective.

5.4.11.2 Design Procedures

1. All exterior wood or wood in contact with water, masonry, or earth will be pressure treated.
2. Consult with the architect to determine if fire-retardant treatment is required.
3. Wherever possible use framing anchors and hangers. Avoid using nailed connections (i.e., toe-nailed connections, etc.). Indicate all framing anchor and hanger types on the drawings.

5.4.12 Metal Building Systems

5.4.12.1 General

Typical applications for metal buildings can be divided into the following three general categories, based on construction cost and performance:

- Light industrial and agricultural buildings for equipment storage and warehouse use
- Municipal and industrial maintenance and process-type applications
- Office, commercial, and retail uses, either single story or multistory using high-quality finishes

5.4.12.2 Design References

The structural specification and design of pre-engineered metal building systems must conform to the following building codes and references:

- International Building Code current edition
- *Minimum Design Loads for Buildings and Other Structures*, ANSI/ASCE 7
- *Metal Building Systems Manual*, Metal Building Manufacturer's Association (MBMA)
- Check the anchor bolts for combined shear and tension. A common practice is to provide steel shear angles in the top of the concrete pier, flush with the top of the concrete with the vertical leg down, to increase the shear capacity of the anchor bolts to the allowable single shear of the steel bolt. Consolidate the concrete properly below the horizontal legs of the shear angles to provide an adequate bearing surface for the base plate.

Column Pier. The pier must be large enough to accommodate the column base plate and the rebar cage around the anchor bolts, while factoring in that the centerline of the column base plate and the base plate size may vary among building suppliers. Reinforce the column pier with a minimum of four vertical bars with column ties and include an extra tie at the top. The reinforcing-steel cage should be large enough to enclose the anchor bolts and still provide some tolerance.

Endwall Columns. Check the width of the concrete bearing area required for the endwall columns. The endwall column base plate may fit on a 12-inch-wide foundation wall, without the need for pilasters.

5.4.13 Foundation Requirements

5.4.13.1 Geotechnical Investigation

Design/Builder shall hire a geotechnical consultant to conduct a site specific geotechnical investigation for foundation design of the proposed public transportation facility. The geotechnical consultant shall be responsible for determining all details of the geotechnical investigation so as to obtain sufficient subsurface information, material properties, and analytical data for developing the necessary design recommendations.

The geotechnical consultant shall determine the exact number, spacing, and depths of all borings, the drilling procedure and equipment to be used, and the sampling type, frequency, and procedure to be followed. A minimum of five Standard Penetration Test

(SPT) (ASTM D-1586) borings for the transfer building, three SPT borings for the Office and Maintenance building, and four SPT borings for the scales shall be made. The borings should be made to at least 30 feet below the ground surface. Special field testing techniques, such as cone penetrometers, that is deemed expedient to the consultant and of optimum benefit to the project may be used. The geotechnical consultant is also responsible for the numbers and types of laboratory tests to be performed, and the material properties to be determined.

5.4.13.2 Report Requirements

At the conclusion of the geotechnical exploration, the consultant shall prepare a written report describing the results of the field investigation, laboratory testing, and engineering analyses, and summarizing the foundation design recommendations for the proposed construction. The items that must be included in this report are listed below.

1. Description of project location, site condition.
2. Description of proposed construction, layout, and structural design data as they pertain to the exploration.
3. Clear definition of scope and purpose.
4. Description of regional geology.
5. Description of field and laboratory testing performed.
6. Summary of results, including:
 - a. Soil profile
 - b. Water table, anticipated fluctuations, groundwater elevation to be used for design
 - c. Appropriate design parameters obtained from field and laboratory testing (grain size analysis, Atterberg limits, cohesion, friction angle, permeability, and compressibility).
 - d. Results of analyses (bearing capacity, settlement)
7. Boring logs, including:
 - a. Location, boring number, elevation of ground surface at boring location
 - b. Name of driller and geotechnical engineer present at time of drilling
 - c. Equipment type and models used; drilling method
 - d. Location of each sample taken, type of sampler used, Standard Penetration Test blow count or other test results
 - e. Unified Soil Classification and verbal description of each soil sample including type, moisture, density, colorations, and stratification
 - f. Graphic representation of strata based on field examination and logging and verified by laboratory tests

- g. Locations of changes in strata by depth or elevation
 - h. Groundwater elevation
8. Graphic Representations, including:
- a. Site location map
 - b. Site plan showing boring locations and proposed construction
 - c. Results of laboratory tests (data plots, output curves)
 - d. Subsurface profiles or diagrams as may be appropriate
 - e. Exploratory drawings clarifying recommendations or details of construction
9. Recommendations

The geotechnical consultant shall make interpretations of the field and laboratory results in order to develop foundation design recommendations for all proposed structures and to identify areas where problems may be expected in the design, construction, or serviceability of the facilities. As a minimum, these recommendations shall include the following:

- a. Site Preparation - Detailed foundation preparation procedures, including site stripping, over-excavation, subgrade compaction, and removal of unsuitable materials.
- b. Footings - Allowable bearing pressures, maximum estimated total settlements and differential settlements, minimum depth of embedment, and foundation preparation for each structure.
- c. Slabs-on-grade - Modules of subgrade reactions and anticipated total and differential settlements.
- d. Pile Foundation - Material types/alternatives investigated; vertical, lateral, and uplift capacities, estimated settlements; spacing, connections, load distributions restrictions; depths, driven lengths, size of piling; construction procedures including pre-punching, hammer type, sizes, refusal or bearing criteria; load tests, indicator tests, pile driving analyzer tests, inspection procedures
- e. Excavations - Permissible excavation slopes, sheeting and shoring, construction dewatering requirements.
- f. Fill and Backfill - Acceptable materials and source of materials, placement procedures, thickness of lifts, degree of compaction required, lateral earth pressures (where applicable), maximum allowable fill slopes.
- g. Trench Backfill - Compaction, applied loads on buried conduits.
- h. Materials - Suitability of excavated materials for use as fill or backfill, physical requirements for imported fill materials or for special materials around pipes or beneath footings. Also, modulus of subgrade reaction, in-place density, and moisture content of native or imported materials.

- i. Surcharge – Estimated surcharge height, placement and settlement monitoring procedures, and estimated time for settlements induced by surcharge to reach steady state.
- j. Pavements – Subgrade excavation and compaction requirements, Lime Rock Bearing Ratio (LBR) values, and source and material requirements of base course material.
- l. Other – Specific provisions to accommodate specific subsurface conditions that are encountered which might affect the design, construction, or serviceability of the proposed facilities.

5.4.13.3 Pile Foundation

Type of Piles

Pile foundation shall be designed to support the proposed Administration building, Bus Maintenance area, Bus Wash building, Fuel Island and retaining walls.

The pile foundation shall consist of augered cast-in-place piles, as recommended by the Geotechnical Engineer. Proposed pile design shall be submitted to Geotechnical Engineer for review prior to design. Other pile types, such as prestressed reinforced concrete piles, steel pipe piles, or steel H-piles, may be considered if submitted for review by the Geotechnical Engineer prior to commencement of design.

Static Pile Load Tests

For projects in high velocity hurricane zones, if piles are designed to support a compressive capacity greater than 36 tons, FBC requires load testing. If required, a minimum of two static pile load tests shall be conducted at the site to confirm the design pile capacity. The test piles shall be installed with the same equipment and methods to be used to drive the production piles.

Dynamic Pile Tests

For prestressed reinforced concrete piles, steel pipe piles, or steel H-piles, the pile load tests may be replaced with dynamic pile tests (DPT). DPT using a Pile Driving Analyzer (PDA) should be conducted to monitor the performance of the test piles and a select number of production piles during installation. The performance of DPT should be used to evaluate actual driving stresses, to evaluate suitability of the pile hammer in advancing the pile, to develop criterion for terminating the driving of production piles, and to assess the integrity and capacity of the production piles.

5.5 Mechanical

5.5.1 Overview

The general mechanical technical requirements are presented herein as a guideline for the minimum criteria to be followed during the design and construction of this project.

All similar pieces of equipment for this project, including but not limited to pumps, valves, and gates, shall be furnished by the same manufacturer to maintain uniformity.

5.5.2 General Access and Layout Requirements

The design and construction of all facilities under the scope of this project shall incorporate equipment layout guidelines as given herein and shall meet federal codes such that adequate access and support facilities are provided for operation and maintenance. Specific requirements for equipment layout follow.

- The minimum spacing around equipment shall be as per all federal and local codes or 3 feet, whichever is greater. Maintenance requirements, especially on large equipment, shall be taken into account by the Designer/Builder when establishing the layout.
- Arrange equipment and piping to prevent any tripping hazards.
- Piping that would limit personnel access shall be a minimum of 7'-6" clear above the floor.
- Locate all equipment and panels on reinforced concrete pads.
- Indicate and identify all space required for removing, replacing, and maintaining equipment on the drawings.
- Provide stairs and hatches for accessing and removing equipment weighing over 100 lbs.; ladders are not allowed.
- Provide lifting eyes, hoists, monorails, and cranes for disassembling or removing equipment.
- Provide lifting eyes for equipment weighing 100 pounds or more.
- Leave room for installing future equipment where future needs are defined in the facility specific criteria.

In addition, follow these general guidelines for the layout of all piping and valves:

- Locate washdown and secondary drains for proper maintenance of equipment and the building. Design/Builder shall refer to the general building design criteria and technical requirements for plumbing requirements.
- Locate piping so that it is not a safety hazard, or a barrier to accessing equipment.
- Lay out the piping within 6 feet of the walls so it can be supported easily, particularly in spaces with high ceilings.

- Provide pipe supports and show their locations on the drawings.
- Provide flexible connections for easily assembling and disassembling piping and for connections to equipment. Ensure that adequate thrust restraint is provided at each flexible coupling.
- Determine and locate the placement of anchor and expansion joints on the drawings.
- Provide adequate clearances for rising stem valves and gates in all positions.
- Gas piping shall not be concealed or located under building slabs or in crawl spaces.
- Water lines or ductwork shall not be run over electrical rooms.

The Design/Builder shall accept that the above listed criteria are minimum requirements and do not exempt the Design/Builder from meeting all Federal and local laws, codes, and regulations.

5.5.3 Pipe Technical Requirements

5.5.3.1 General Piping Standards

The following design standards shall be followed to ensure that the system is adequate for the intended service and sufficiently sized for future conditions:

- The following standards shall be applied to the design and construction of the pipelines:
 - A 10-foot horizontal separation and a 12-inch positive vertical separation between water and wastewater pipelines shall be maintained throughout. Water pipelines shall be installed at a higher elevation than wastewater pipelines.
 - Tie-ins to existing lines shall be made only after a minimum of 48 hours prior notification to the local agency.
 - Any necessary system shutdowns shall be strictly coordinated with the local appointed agency. It is possible that tie-in work may have to occur during off-hours.
 - Provide adequate flushing locations and sample taps to allow adequate disinfection and bacteriological sampling.
 - Disinfect, sample, and test potable water lines in accordance with AWWA standards.
- The sanitary system shall be capable of adequately handling all flows generated within the facility.
- The non-potable water system shall be capable of adequately providing water to all required locations within the facility. Additional requirements are as follows:
 - Use tees for all new construction as needed.
 - Any tap on a water main for non-potable water supply shall be a minimum of 2 inches, with a gate valve immediately following the tap. The valve shall be clearly identified and easily operated.

- Primary runs (>30 feet) of non-potable water piping shall be a minimum of 6 inches diameter pipe. Short feeder lines shall be no smaller than 2 inches diameter pipe. All taps (or tees) made for individual supply lines shall be immediately followed by a gate valve.
- Sufficient valves shall be supplied to allow isolation of potential problem areas while minimizing the effect on other services. At a minimum, two valves shall be provided at a tee and three valves shall be provided at a cross.
- Clean/pig all yard piping and new raw/finished transmission mains prior to start-up. These activities shall be coordinated with all parties, shown on the project schedule, and included in the start-up procedure.
- Backflow prevention shall be provided by reduced pressure backflow preventers. The non-potable water shall be isolated from the potable water. Also provide a backflow preventer at each building.
- Use materials compatible to the service, considering, but not limited to the following factors: corrosion, erosion, dynamic and static pressure loads, and temperature.
- Ensure conformity of piping, labeling, and pipe location to applicable codes for all hazardous chemicals.
- Support piping connected to equipment with a pipe support and not with the equipment. Pipe supports shall withstand the dead loads imposed by the weight of the pipes filled with water and shall have a minimum safety factor of 5.
- Provide ¾ inch hose bibs around the building; coordinate with architect.

5.5.3.2 Pipe Schedule

Pipes shall be color coded according to service and shall be labeled with the appropriate flowstream identification. Pipe designations and colors are defined in the master pipe schedules in Table 4-5-1 and 4-5-2.

TABLE 4-5-1
Master Pipe Schedule

Designation	Service	Pipe Material	Installation	Notes
D	Drain	PVC-DWV	EXP/BUR	Chemical compatible material
DF	Bio-Diesel Fuel	STL	EXP/BUR	Buried DF shall be double contained with PVDF containment
FOS	Fuel Oil Supply	STL	EXP/BUR	Buried FOS shall be double contained with PVDF containment
FOR	Fuel Oil Return	STL	EXP/BUR	Buried FOS shall be double contained with PVDF containment
HW	Hot Water	CU	EXP	

TABLE 4-5-1
Master Pipe Schedule

Designation	Service	Pipe Material	Installation	Notes
NP	Nonpotable Service Water	CU, PVC	EXP/BUR	DI for exposed piping. CU and PVC for pipe < 3".
OF	Overflow	CPVC	BUR/EXP/SUB	
PO	Potable Water	CU, PVC	EXP/BUR	DI for exposed piping. CU and PVC for pipe < 3".
RS	Raw Sewage	PVC	EXP/BUR	
SD	Storm Drainage	RCP	BUR	
SFM	Sanitary Force Main	PVC	BUR	
SPD	Sump Pump Discharge	PVC	BUR/EXP/SUB	
SSW	Storm Sewer	RCP	BUR	

TABLE 4-5-2
Piping Color Code

Designation	Service	Tnemec Colors *
CDW	Cold Water	Fountainbleu (GB04)
D	Drain	Black (IN06)
DF	Bio-Diesel Fuel	Safety Red (SC09)
FOS	Fuel Oil Supply	Safety Red (SC09)
FOR	Fuel Oil Return	Safety Red (SC09)
HW	Hot Water (Potable)	Mineral Spring (AY62)
NP	Non-potable (backflow prevented) water	Dewdrop (AW82)
OF	Overflow	Medium Bronze (# 312/IN02)
PO	Potable Water	Castaway Blue (B3573)
RS	Raw Sewage	Brown (DO794)
SD	Storm Drainage	Trojan Grey (A3684)
SFM	Sanitary Force Main	Trojan Grey (A3684)
SPD	Sump Pump Discharge	Gray (IN05)
SSW	Storm Sewer	Flint Black (D3206)

* Paint numbers correspond to Tnemec color system. Match colors if paint is supplied by a different manufacturer.

5.5.4 Compressed Air System

A compressed air system shall be provided to supply air for shop equipment. Air compressor shall be single large capacity "screw drive".

5.5.5 Design Procedures

5.5.5.1 Equipment Data Sheets

An equipment data sheet shall be filled out completely for each piece of equipment selected. Data sheets are required for all mechanical equipment. Refer to the attached sample equipment data sheet (Exhibit 4-5-1) for required information.

EXHIBIT 4-5-1
Equipment Data Sheet

PROJECT NAME: _____

FACILITY: _____

PROJECT NUMBER: _____ **DATE:** _____ **ENGINEER:** _____

EQUIPMENT NAME: _____ **QUANTITY:** _____

MANUFACTURER; SIZE; CONFIGURATION: _____

MATERIALS OF CONSTRUCTION: _____

POWER REQUIRED: _____ HP _____ volts _____ phase

DRIVE: _____

(Type; Var./Con. Speed; Syn. Speed; Configuration)

ENCLOSURE TYPE: MOTOR: _____

SPEED RANGE (rpm): MAX: _____ **MIN:** _____ **EQUIPMENT WEIGHT (lbs.):** _____

SUPPORT UTILITIES REQUIRED (qty., if known): _____

(Comp. Air, Drains, etc.) _____

EQUIPMENT COST: QUOTE: _____ **DELIVERY:** _____

VENDOR: _____ **TELEPHONE:** _____

MISCELLANEOUS COMMENTS, DATA AND INFORMATION: *(Vibration; Equipment Pads; Controls; Dim.; Atmospheric Hazards; etc.)* _____

SPECIFICATION SECTION NO.: _____

LOCATION OF EQUIPMENT: _____ Drawing Sheet No. _____

REVISION	DATE	NO.	BY

5.6 Building Mechanical

5.6.1 HVAC

5.6.1.1 HVAC System Functions

The HVAC systems shall perform the following functions:

- Maintain constant mechanical ventilation in the Facility to provide heat relief and minimize condensation and corrosion.
- Process incoming outside air by filtering to protect coils.

5.6.1.2 General HVAC Drawing Criteria

The following requirements shall apply to HVAC drawings:

- Ensure the minimum scale for ductwork and piping plans is $\frac{1}{8}$ inch = 1 foot. For congested areas and equipment rooms, partial plans shall have a scale of $\frac{1}{4}$ inch = 1 foot.
- Provide sections and elevations for all major equipment and multiple layers of piping or ductwork. Sections and elevations shall have a scale of $\frac{1}{4}$ inch = 1 foot.
- Indicate the airflow through various rooms and duct systems on an air-balance diagram as part of the construction documents. The air-balance diagrams shall, as a minimum, show the following:
 - Ventilated spaces with space identification
 - Ventilation air flow in cubic feet per minute (cfm)
 - Ventilation rate in air changes per hour and design basis
 - Infiltration or exfiltration rate in cfm (to positively pressurize the occupied building).
 - Air pressurization criteria
 - All ductwork, fans, air handlers, and control instruments
 - Equipment identification numbers (IDs)
 - Equipment capacities in cfm
 - Duct air flows in cfm
 - Pressure relief dampers
 - Control dampers
 - Duct smoke detectors
 - Fire-rated and smoke control dampers
 - UV sterilization lamp

In addition, the following shall be provided where applicable:

- Standard construction detail sheets
- Energy calculations for applicable buildings
- Automatic temperature-control systems

The following information used by construction field personnel shall be on the drawings:

- Equipment installation details

- Equipment schedule sheet
- Fire damper locations
- Ductwork layout
- Ductwork hangar details (where applicable)
- Supply diffuser connection detail

5.6.1.3 HVAC Design Procedures

Codes and Standards

See Section 5.1.1 for Regulatory Requirements.

Calculations

Calculations must follow the methodology outlined in applicable energy codes, the latest edition of ASHRAE's Handbook of Fundamentals, and referenced ASHRAE handbooks and publications.

At a minimum, calculations shall be performed for the following:

- Heat transmission coefficients
- Space heat gain
- Space ventilation rates
- Exhaust ventilation capture velocity
- Ductwork pressure loss
- Fan motor sizing
- Condensation control
- LEED documentation, as required

Ventilation rates shall be calculated for all applicable criteria, and the highest ventilation rate shall be used for design.

Evaluations

As part of the design, the following items shall be evaluated:

- Ventilation rates versus electrical area classification
- Refrigeration type: degree of environmental impact, zero use of CFC-based refrigerants
- Whole Building Energy Simulation model (refer to LEED Reference Guide, Energy and Atmosphere Prerequisite 2, Minimum Energy Performance.)

In areas where other criteria do not require a higher ventilation rate, the selected ventilation rate shall be based on an evaluation of the following factors:

- Potential occupancy of the space
- Cost of air cooling, including capital and O&M costs
- Number of operators
- Electrical classification of the space

Design and Layout

In making layouts, the following requirements shall be observed:

- Mechanical room shall be air conditioned.

- Position air-handling units so filters and coils can be pulled and removed from the building without demolishing permanent walls or structures.
- Mount equipment and panels on pads to protect from washdown.
- Mount outdoor equipment above flood line.
- Provide recommended clearance (no less than 3 feet) between the outermost extremities of adjacent pieces of equipment or between a wall and a piece of equipment.
- When equipment is not mounted on the floor, provide service platforms with suitable access.
- Provide lifting lugs for removing equipment.
- Locate piping so it does not create a hazard to workers or prevent access to equipment. Allow a minimum clearance of 7 feet for a walkway (8 feet is preferred.)
- Lay out piping close to walls for better support, particularly in areas with high ceilings.
- Verify that equipment can be replaced. Clearance for the largest component is acceptable if removing the assembled unit is not feasible. Where a standby unit is required, replacing one unit should not require shutting down the standby unit for access or removal.
- Check alternate supplies when determining space requirements. Consider the need for removing the fan shaft if using externally isolated units.
- Pipe supports are generally not shown on the layout drawings. Locations for anchoring rigid pipe should be shown. Acceptable types of supports and anchorage details are shown on the standard details.
- Provide flexible connections so piping and ductwork can be easily assembled and disassembled.
- Locate electrical equipment that is in washdown areas at least 3 feet from the floor.
- Allow ample space for diaphragm-, cylinder-, and motor-operated valve and gate actuators.
- Provide adequate clearance for rising-stem valves and gates.
- Do not run ductwork over electrical equipment.
- Insulate condensate lines and route to nearest hub drain at full size of unit connection.
- Provide auxiliary drain pans for suspended air handlers.
- Provide duct smoke detectors per Florida Building Code, Mechanical.
- Provide adequate clearance for equipment installation, operation, and maintenance.

In addition to the layout information listed above, the following requirements shall be observed on piping drawings:

- Provide for draining gravity lines.
- Piping should be at least $\frac{3}{4}$ inch to provide rigidity.

- Design sufficient flexibility into piping systems to allow for thermal expansion and contraction without using expansion joints.
- Provide shut-off valves so the systems can be serviced without major shutdowns.

HVAC System Types

The following are basic requirements for the HVAC systems.

Ventilation Systems

Ventilation systems shall provide ventilation to space with supply and exhaust fans. Ductwork shall be installed to increase air movement and to eliminate dead spots where applicable.

Air Conditioning Systems

Air-conditioning systems shall provide space temperature and humidity control utilizing direct expansion refrigeration systems with air handling and ducted air distribution.

Wind Load on HVAC Systems

HVAC equipment located outside buildings shall be designed and installed to withstand winds of 150 miles per hour for wind born debris regions per Florida Building Code. All louvers shall bear the Notice of Acceptance for Miami-Dade approval. HVAC equipment located outside shall be designed according the Florida Building Code and Manufacturer's design criteria.

Outdoor Environment Design Conditions

Outdoor design conditions are determined on the basis of applicable energy code criteria or ASHRAE data as applicable.

- Summer: 90°F Dry Bulb/78°F Wet Bulb (ASHRAE 2009 Fundamentals, 0.4%)
- Latitude: 24°33'N

Indoor Design Conditions

Indoor design conditions shall be determined based upon occupancy and equipment requirements. Proper dehumidification and cooling shall be provided in air-conditioned spaces. Unless otherwise specified, occupied spaces shall be air conditioned to maintain 75°Fdb.

Building Envelope Heat-Transmission Coefficients

Buildings, spaces, or rooms that have air-conditioning systems for cooling shall be enclosed in building envelopes that meet the Florida Building Code, Chapter 13, Energy Efficiency Code for Construction.

Ventilation Air Rates: Shall comply with the Florida Building Code, Mechanical.

Location of Ventilation Air Intake, Air Distribution, and Exhaust Air

- Filtered outdoor air, and/or filtered and cooled outdoor air, shall be drawn in by supply air fans and distributed into the buildings. The supply shall then be distributed to work

areas and low-odor areas of each building. Locate outdoor air intakes to prevent intake of odorous air and vehicle exhaust emissions. Coordinate with architect to ensure air intakes are no closer than 25 feet to designated outdoor smoking areas.

- Locate exhaust discharge points away from outdoor air intakes (minimum of 10 feet away). Locate intake air louvers and vehicle exhaust emissions in the opposite walls. Exhaust discharges shall *not* be located where they will discharge onto people. Louvers shall not be used over doors for exhaust.
- Design intake louvers and hoods for face velocity, approximately 500 to 600 feet per minute through the free area. Louvers should be approximately 42 percent free area. Shut-off dampers for intakes and exhausts shall be located at the intake or discharge opening and not at the fan suction or discharge.

Outdoor Air Filtration

For offices in areas with odorous outdoor air, replaceable, impregnated carbon filters with post filters shall be used for removing odors.

Use vertical blade intake louvers to minimize water penetration. Filters for administration areas should have a 35 percent dust spot efficiency, with the remaining areas having a 25 to 30 percent dust spot efficiency.

Building Pressure Control

Clean spaces shall maintain a positive air pressure, and odorous spaces shall have a negative air pressure. When adjacent spaces are odorous, the more odorous space shall have a negative pressure relative to the less odorous space.

- Evaluate spaces on the basis of the air tightness of the space to maintain the required pressure difference between supply and exhaust. In addition, the system shall be balanced after construction to the required pressure differential.
- Consider the potential for air leaks at the openings in odorous areas that will be open during normal operation.

System specifications shall define balancing procedures for both air flow and pressure control.

Volume Control for Ventilation Air in Service Bays

All ventilation systems shall operate continuously, not intermittently. Redundant ventilation capacity or the need for emergency power for the ventilation systems shall be provided where specific criteria dictates.

Noise Control

HVAC systems serving occupied areas shall be designed to meet the average noise criteria (ANC) levels recommended by ASHRAE. Noise produced outside of the buildings shall be evaluated to comply with local codes and ordinances. The evaluations shall also consider the sound emission criteria for all other sources.

Duct Construction Materials

The following duct materials shall be provided:

- Use aluminum sheet metal for all air conditioning supply and return air ducts.
- Use aluminum sheet metal for bathroom exhaust ducts.
- Use aluminum sheet metal for the Service Bays, Shop areas and Bus Wash ductwork.
- Do not use reinforced polyester or vinyl ester duct or aluminum duct to convey flammable vapors.
- Metallic ductwork shall conform to the latest SMACNA standards. Exhaust ductwork shall comply with SMACNA industrial ductwork standards. Nonmetallic ductwork shall comply with Underwriters Laboratories (UL) and SMACNA standards.
- Use round ductwork wherever possible for exhaust system. If rectangular ductwork is required, the aspect ratio shall not exceed 4 to 1, except where necessary. Ductwork shall be designed for a maximum pressure drop of 0.10 inch water gauge per 100 feet of duct. Maximum duct velocities shall be as follows:
 - Offices and administration: 1,500 fpm
 - Maintenance areas: 1,800 fpm
- Access doors shall be installed to clean out dust- and dirt-laden duct systems. Doors shall be 24 inches x 24 inches or the largest door that will fit into the duct.
- Ductwork shall run inside of building.
- Insulate ductwork as required by the FBC, Chapter 13 and where necessary to prevent condensation.

If any of the preceding/referenced standards conflict, the most stringent requirements shall govern.

Equipment, Ratings, and Materials

All HVAC equipment shall meet space efficiency requirements imposed by the FBC, Chapter 13. Additional requirements follow:

- Provide at least two manufacturers wherever possible (the project manager must approve any exceptions). Model numbers also shall be stated for the alternate manufacturer, if stated for the design basis manufacturers. If no alternate manufacturer can be determined, the designer shall write a performance specification, omitting any mention of a specific manufacturer.
- Roof-mounted equipment, such as roof exhaust fans and or air handling units, shall be used only with CITY permission. Suitable access is required for all roof-mounted equipment. Service platforms shall be built for all roof mounted equipment. All roof mounted equipment shall pass both small and large missile impact test per Florida Building Code.
- Fans and air-handling units made of materials suitable for the air stream and surrounding conditions. For all major fan systems, the designer should prepare a fan

curve of the selected fan with the calculated system curve, at design, and both plus and minus 10 percent of flow, to prove stable fan selection.

- Provide fans with a 70 percent or greater efficiency, if possible.
- Provide equipment in Service Bays and Bus Wash to withstand wet conditions.
- Use a margin of safety for heat gains of 10 percent.
- The following margins of safety for static pressure of fans as recommended by the Associated Air Balance Council shall be provided:
 - Low number of zones and balancing dampers: 20 percent
 - Medium number of zones and balancing dampers: 30 percent
 - High number of zones and balancing dampers: 40 percent
- Use AMCA Publication 201, *Fans and Systems* as reference for non-ideal fan installations. Provisions shall be made for the effects of fan inlet and outlet configuration on static pressure losses, including poor fan inlet and outlet conditions and air acceleration in exhaust fans.

Corrosion Control

Outdoor heat rejection equipment coils shall be dip coated with a corrosion and moisture resistant film to prevent damage by airborne corrosive particles and fumes that may be present in the facility environment.

HVAC equipment, ductwork and air distribution devices exposed to the outdoors or conveying outdoor air shall be provided with protective coatings and/or constructed from corrosion resistant materials.

Control System

- The HVAC control system shall include local control panels for equipment, either provided with packaged equipment, or free standing to serve one or more air handling units. The HVAC controls subcontractor shall provide these local panels to provide complete control of the system. Provide NEMA 4X rated control panels that shall provide protection in moist, humid, and/or corrosive areas (where applicable).
- Night setback, temperature reset, and other energy-saving features shall be specified where practical and where those features do not interfere with other design criteria. However, the Energy Code's control requirements shall always be met. Economizer cycles are discouraged due to high humidity and high cooling degree days.

Coordination with Other Disciplines

The following steps provide guidance for coordination:

- HVAC designers shall interface with control system designers to define the number and types of points and the required types of signals.
- Ventilation systems shall be coordinated with fire-detection systems so fans can be shut down and duct-mounted smoke sensors can signal the facility's fire alarm system.
- See Section 5.1.2.5 for Mechanical coordination recommendations.

5.6.2 Plumbing

5.6.2.1 Plumbing System Functions

The plumbing system shall perform the following functions:

- Provide comfortable and odorless condition in buildings and areas intended for human occupancy.
- Provide sewer and potable water service for non-process sanitary functions
- Provide sump and sump pump to evacuate elevator pit
- Provide potable water services for emergency shower and emergency eye wash.

5.6.2.2 General Plumbing Drawings Criteria

In addition to the plumbing design procedures, the following requirements shall apply to the plumbing drawings:

- Use $\frac{1}{8}$ inch = 1 foot as the minimum scale for plumbing plans. For enlarged views, partial plans shall have a scale $\frac{1}{4}$ inch = 1 foot.
- Drawings shall include the following plumbing details if required for the building or facility as described in the specific criteria:
 - Non-process sanitary-fixture drains
 - Plumbing-fixture water supplies (hot and cold)
 - Vent piping
 - Roof drains and piping
 - Isometric for sewer system
- Extend the drawing of the building drain and water service for each building or facility 5 feet outside the building line. The drawing of the utility services, beyond 5 feet of the building, shall be shown on the civil site drawings.

5.6.2.3 Plumbing Design Procedures

Codes and Standards

See Section 5.1.1 for Regulatory Requirements.

In cases where existing facilities are included in the scope of work and the existing plumbing systems do not meet current code requirements, the plumbing systems shall be modified to meet these requirements.

Plumbing Calculations

Calculations of the following items are required for plumbing:

- Cold- and hot-water-network pipe sizing, and sewer pipe sizing in accordance with the Florida Building Code and the Florida Plumbing Code
- Water heaters, in accordance with the guidelines recommended by ASPE; for procedure see *ASPE Data Book 1989, Volume I – Fundamentals of Plumbing Design*, Chapter 4
- Pipe sizing for other building services such as fire sprinkler and irrigation networks
- LEED calculations (such as projected potable water usage) and documentation, as required.

Other calculations not listed may also be needed for specific facilities or systems.

Plumbing Layout

The plumbing drawings shall follow the requirements listed below:

- Locate sumps at depths sufficient for properly draining gravity lines. Inform the structural designer of sump requirements.
- Piping embedded in slabs shall be positioned to avoid interfering with reinforcing bars. Always inform the structural designer if pipes will be embedded. Pipe joints shall occur at slab joints for embedded pipe.
- Provide unions at joints so piping and equipment can be disassembled.
- Insulate branch connections for hot-water-system piping to minimize sediment carryover.
- Maintain water mains to a minimum of $\frac{3}{4}$ -inch diameter in long horizontal runs.
- Locate cleanout in accessible areas for services and no less than 18 inches from any wall.
- Provide a higher invert elevation of any plumbing branch of 18 inches minimum from finish floor elevation.
- Locate hot and cold piping to minimize safety hazards.
- Provide adequate space to install pipe supports.
- Provide adequate clearances for shut off valves.
- Do not run water lines over electrical rooms.
- Coordinate underground piping with structural, electrical, and HVAC elements.
- Unless otherwise indicated, all drainage piping 3 inches and smaller shall be sloped $\frac{1}{4}$ inch per foot. Larger pipes, of 4 inch nominal dimension, shall be sloped $\frac{1}{8}$ inch per foot.

Pipe Support and Anchorage

All pressure piping shall be restrained. All pipe, gravity, and pressure shall be positively restrained at wall and slab penetrations.

Locations for anchoring rigid pipe shall be shown on the drawings. Acceptable types of supports—guides, saddles, penetrations, and structural attachments for general pipe support, as well as anchorage details—shall be shown on the standard details. Piping shall be vertically supported by anchor brackets, guides, saddles, or hangers. Each run at each change of direction shall be supported. In general, existing pipes and supports cannot be used to support new piping.

All nonmetallic pipes 3 inches in diameter and smaller shall be continuously supported with structural channel or other appropriate means.

Pipe Protection

All polyvinyl chloride (PVC) pipelines shall be evaluated to determine if mechanical protection is required to prevent catastrophic failure, such as a tank inadvertently emptying. No PVC piping shall be installed in ventilation plenum.

5.6.3 Fire Protection

5.6.3.1 Overview

The general fire protection technical requirements are presented herein as a guideline for the minimum criteria to be followed during the design and construction of this project.

All similar pieces of equipment for this project, including but not limited to sprinkler heads, fire department connections, and valves, shall be furnished by the same manufacturer to maintain uniformity.

5.6.3.2 Fire Protection Drawing Organization

Fire protection drawings shall be organized as follows:

- Abbreviations, Legend, and General Notes
- Floor Plans (by building)
- Details

5.6.3.3 General Fire Protection Drawing Criteria

- Use $\frac{1}{8}$ inch = 1 foot as the minimum scale for fire protection plans. For enlargement view, the partial plans shall have a scale $\frac{1}{4}$ inch = 1 foot.
- Drawings shall include the following fire protection details if required for the building or facility as described in the building specific criteria:
 - Fire sprinkler risers
 - Seismic/sway bracing
 - Hangars/supports

5.6.3.4 Fire Protection Design Procedures

Refer to Section 5.1.1 for Regulatory Requirements.

5.6.3.5 Fire Protection Calculations.

Calculations of the following items are required:

A fire hydrant flow test shall be performed per NFPA 291 requirements prior to preparation of hydraulic calculations, to determine the adequacy of the water system to supply the fire suppression system requirements. Test data shall be submitted for review prior to preparation of fabrication drawings.

Hydraulic calculations and fabrication drawings shall be prepared per NFPA 13 requirements and submitted for review prior to fabrication of the fire sprinkler system.

5.6.3.6 Fire Protection Layout

The fire protection layout shall follow the requirements listed below:

- Piping shall be designed perpendicular or parallel to building walls and structural framing members.
- Piping shall be equally spaced as much as possible in areas with no finished ceiling.
- Slope piping to drain.
- Piping shall only be attached to structural framing members and no other piping shall be hung from fire suppression system hangers or piping.
- Pipe hangers shall be spaced per NFPA 13 requirements.
- Piping shall not be routed over electrical equipment or through electrical rooms.
- Piping shall be sized to limit velocity in piping to 20 feet per second or less.
- Fire alarm risers shall be located in an area readily accessible to the local fire department. Adequate clearance around riser shall be provided for maintenance.
- Fire department connection shall be located within 150 feet of a fire hydrant.
- Fire hoses (1 ½-inch) shall be installed at opposite corners of the service bays, as close as practical to the roll-up doors.

5.6.3.7 Fire Sprinkler Pipe

Fire sprinkler piping shall be black steel, schedule 10 or schedule 40, with rolled grooves or threaded fittings.

Piping in exposed areas shall be painted red. Pipe above finished ceilings shall be labeled with stick-on labels.

5.6.3.8 Fire Sprinkler Pipe Testing

All sprinkler piping shall be hydrostatically tested per NFPA 13. Testing shall be at 200 PSI for 2 hours with no loss of pressure.

Piping between the exterior fire department connection and the check valve shall also be hydrostatically tested at 200 PSI for 2 hours with no loss in pressure.

Water flow devices shall be flow tested utilizing the inspector's test connection. Alarm must sound within 5 minutes of start of flow and continue to alarm until the flow stops.

Tamper switches shall be operated to verify their operation and appropriate signal is sent to the fire alarm system.

5.7 Electrical

5.7.1 Introduction

The electrical system is intended to continuously and reliably provide power to all equipment. The major functions of the electrical system are as follows:

- Provide power to facility
- Standby power generation
- Equipment protection
- Sequential/logic control (discrete equipment control)

5.7.2 Regulatory Requirements

5.7.2.1 General

An electrical engineer registered in Florida will be responsible for overseeing the preparation of the electrical design documents. The design will be in accordance with the best professional practices. The design of each task must conform to the requirements of these guidelines.

Refer to Section 5.1.1 Regulatory Requirements for applicable standards and codes.

Applicable federal and local codes and UL listing requirements shall be followed for electrical inspection. Exit signs, emergency egress lighting, and emergency lighting power supply shall conform to requirements of the local code authority.

5.7.2.2 Inspection Authorities

The design will comply fully with the rules and regulations of all authorities having jurisdiction over the electrical work.

If designers contact any of these agencies during the course of the design, they must document these communications. The topics listed below must be resolved at the beginning of the design work:

- Keys Energy Services
 - Connected and demand electrical energy loads
- Telephone Company and City of Key West IT Department
 - Provision of telephone line
 - Provisions for computer connections and wiring
- Electrical Inspector
 - Applicable local codes
 - Third-party listing requirements (UL, CSA, ETL, factory manual)
 - Requirements for reviewing plans
- Building Inspector
 - Exit signage
 - Emergency egress lighting

- Emergency-lighting power supply
- Fire Marshall
 - Hazardous area determination
 - Fire alarm requirements
- Insurance Carrier
 - Fire alarm requirements

5.7.3 Electrical Design Standards

5.7.3.1 Drawings

Legend Sheet

The standard legend sheet of electrical symbols provided in the electrical section will be used without exception on all design drawings. The legend sheet is a general electrical symbol list and may be edited for individual contract drawing sets. The legend may also include electrical abbreviations if there is no separate, comprehensive abbreviation list. If abbreviations are shown on the electrical legend, the list must be complete and accurate. If special symbols are required, they must be shown on the legend and used throughout the entire project.

Site and Area Plans

The electrical site plan will show the location of all buildings, facilities, major equipment, outdoor site lighting (including employee parking), electrical power distribution poles, duct bank routes, hand hole and manhole locations, outdoor electrical equipment locations and points at which duct bank sections are taken. If space on the sheet permits, site electrical plans will include electrical facility designs for facilities which do not require a separate drawing. Area plans will show interferences with existing buried pipes, ducts, and other such equipment. Electrical site and area plans will be overlays to civil site backgrounds where applicable.

Facility Plans

Facility plans will show the location of, and connection to, all equipment and instrumentation that requires raceways or conductors. A separate connection point shall be shown for each of the devices located within an area even if they are all supplied as part of the same package unless the specifications clearly require that all of the devices are to be wired to a single panel or terminal junction box (TJB) by the supplier of the equipment. Spare raceways for future equipment will also be shown and clearly labeled, where appropriate. For each area, there shall be a separate plan created for facility electrical.

On the facility plan, show receptacles, lights, lighting panels and transformers, water heaters, HVAC equipment, motorized doors, fire alarm systems, security systems, telephone systems, and other non-process loads. Facility plans will show lighting fixtures (for normal and emergency lighting), illuminated exit signage, outdoor building-mounted lighting, switch controls, lighting panelboards, and wiring for branch circuits. Home runs may be used to indicate branch circuits' destinations to the local lighting panels or to emergency power supplies.

Wiring for building systems (e.g., fire alarm, security, and security systems) will be shown on separate riser diagrams. A separate riser diagram will be provided for each system.

Enlarged plans will be provided for electrical rooms, and other similar spaces where the plan scale and the number of devices located in a small area make it impractical to show the required information.

Single-Line Diagrams: General Requirements

The single-line diagrams will show the entire electrical distribution system associated with the facility and shall include any electrical service entrance equipment, engine-generators, and their associated switchgear, all distribution switchgear, distribution circuits and other components down to 480-volt utilization devices and 208Y/120-volt panelboards. Circuiting from 208Y/120-volt panelboards to their loads will be shown on the panel schedules and on the plans. Circuiting of 480-volt panelboards loads should be shown on the panel schedules and on the plans where possible. Information on single-line diagrams will include bus capacity, short circuit ratings, overcurrent device types and ratings, protective relay types and ratings, instrument transformer connections and ratings, motor starters and their types and ratings, power transformer connections and ratings, motors, metering and load ratings (horsepower or kilowatt), and other major electrical loads.

The Design/Builder shall coordinate with the local electrical utility for their requirements and include the services to be provided by Owner as part of the work. The single-line diagram shall include major items to be provide by the utility, for example, the medium voltage cables routing, utility transformer, and available utility short circuit rating, and shall clearly identify the Utility interface and coordination.

Single-Line Diagrams: 480-Volt Equipment

A separate single-line diagram will be provided for each 480-volt switchboard. The single-line diagrams will generally be shown on separate drawings. The single-line diagrams for 480-volt equipment will show the primary disconnecting means, primary fuse rating and type, transformer identification, voltages, impedance and KVA ratings, transformer surge protection, 480-volt switchboard and Motor Control Center (MCC) arrangements including number and rating of circuit breakers, ampere and short circuit ratings of the bus, metering and metering instruments. This diagram shall also show interconnection circuits within the 480-volt power distribution system along with identification and ratings of equipment powered from the switchboard.

Single-Line Diagrams: Low Voltage Motor Control Center (MCC)

A separate single-line diagram shall be provided for each MCC. The single-line diagrams will generally be shown on separate drawings. Single-line diagrams for MCC include the ratings of all circuit breakers, ampere, and short circuit ratings for all bus within the MCC, motor starters' sizes and types, power contactors, motor loads and horsepower rating, and all other loads connected to the MCC bus.

Elevations

Front elevations for switchboard and MCC will be provided. The elevations need not be drawn to scale but must show the relative locations of the switchboard circuit breakers and

MCC compartments, over current devices, metering, conductor entrances, and depth of assemblies. The size of MCC buckets must allow space for extra relays, and other equipment, as required. The manufacturer of switchboards and MCC should informally review the elevations of this equipment to ensure proper placement of equipment and check the accuracy of how the equipment is drawn. The depths of assemblies should be noted on elevations.

Motor-Control Schematic Diagrams

Motor-control schematic diagrams shall be grouped together and shown on separate drawings. Motor-control schematic diagrams shall be presented in a standard format. A separate diagram shall be provided for each starter or group of starters with identical controls. The control schematics in the contract documents shall indicate terminals and equipment in which terminations will be made. The schematics shall show all control circuit devices supplied as part of the MCC equipment, field-mounted devices, and devices in panels or equipment furnished under other divisions of the specifications. Control diagrams shall indicate the terminals in I&C panels and other equipment panels to which a terminal connection must be made. Single controls in an I&C panel or equipment panel (e.g., on-off switch and start-stop pushbutton) may be shown in special cases. Complex control in an I&C or equipment panel is to be shown as two terminals in a dashed rectangle with a reference to the I&C panel.

The following control devices, not shown on the P&IDs, shall be shown on the motor control schematic diagrams where they are necessary:

1. ON/OFF/REMOTE switch (where required and not shown)
2. ON/OFF/CP switches (where required)
3. Elapsed time meters (will be provided if the motor falls into the criteria described hereinafter)
4. Ground fault relays
5. Metering
6. Motor heaters
7. Motor thermal devices
8. ON/OFF status lights

Motor control schematic diagrams shall be developed for the equipment located in each MCC. A sample of the standard format for these diagrams is included with the standard details.

Schedules

Schedules will generally be shown on the drawings except in the rare case where there are so many that it becomes clearer to show them in a separate bound volume of 8 ½ inch by 11 inch sheets. The luminaries schedule will show the symbol for the fixture, power rating, voltage, brand name, catalog number, and a brief description of fixture type and use. The luminaire schedule will be available to all designers at the early stages of design and the same luminaire will be used for all similar applications throughout the facility. Panel schedules shall be prepared using a computer spreadsheet program, which allows the final product to be imported into an AutoCAD file and placed electronically onto the drawing.

The panel schedules shall be included on the drawings with the buildings or facilities where they are located or with the one-line diagrams or equipment elevation of the related equipment.

Grounding Plans and Details

The grounding system shall be shown on the drawings. Grounding shall be shown on the site plans, or a separate plan. The grounding plans shall show the grounding electrodes, grounding conductors, equipment busses, and grounding requirements for separately derived systems. The size and ratings of the driven electrodes and conductors shall be shown. Grounding plans shall be supplemented by grounding details. A minimum of one test well per facility shall be provided. A ground bus in the main electrical room is required.

Duct Bank Sections

Sectional drawings of the duct banks shall be provided for underground conduit systems. Conduits shall be listed in the conduit and wire schedules in projects large enough to require conduit and wire schedules. The sections shall indicate the ducts at the point where the section is taken, the configuration of the duct bank, conduit numbers if used, duct section number if used, and concrete encasement and reinforcing. The sectional drawings shall call out the drawing on which the section appears. Duct banks crossing roads shall be provided with re-inforcing.

System Riser Diagrams

Separate riser diagrams shall be provided for the fire alarm, telephone, and communication systems. Riser diagrams shall show all components for each system. The riser shall be arranged to show the relative location of each device or component with respect to the other system devices and components. The name and number of the room or space where the device or component is located shall be noted on the riser diagram. Interconnecting conduits and wiring also shall be shown on the diagrams.

Electrical Specifications

Specifications shall describe specific construction materials, products, and methods of installation. These specifications shall also indicate the design approach and required calculations.

5.7.3.2 Calculations

All calculations are to be prepared on 8 ½ inch by 11 inch sheets. Calculations shall include loads and future loads and include all necessary safety factors. Calculations may be done manually or by computer. Each sheet must show the date the calculations were performed, the project number, and the signature of the person performing the calculations.

At a minimum, the following calculations will be prepared:

- Total load summary and impact on the service-entrance and distribution switchgear
- Load summaries for each switchgear, substation, MCC, transformer, and panelboard
- System short circuit analyses
- Preliminary system coordination analyses
- Voltage-drop calculations for feeder and branch circuits that are heavily loaded or over 500 feet long
- Lighting calculations
- LEED documentation, as required.

5.7.4 Technical Requirements and Guidelines

5.7.4.1 Power Distribution Planning

General

Provide disconnect switches for all HVAC equipment that has any integral controls (i.e., unit heaters, compressors, duct heaters, air handlers, etc.).

Hazardous Areas

The various areas of the project that may contain concentrations of hazardous gases shall be reviewed against the requirements of NFPA. The areas that will be affected include enclosed areas considered Hazardous Class I, Division I due to the presence of gasoline unless adequate ventilation is provided. Other areas may be classified hazardous as required by

NFPA. Devices that contain contacts located in hazardous areas should generally be wired intrinsically safe, except Class I division II areas where hermetically sealed contacts may be installed.

Distribution Voltage Selection

Standard grounded systems for plant voltages shall be used. The designer shall select one of the following voltages, depending on load characteristics and location:

- 480/277 volts, solidly grounded wye, 3-phase
- 240/120 volts, solidly grounded, 3-phase
- 208/120 volts, solidly grounded wye, 3-phase
- 120/240 volts, solidly grounded, 1-phase
- 120 volts, solidly grounded, uninterruptible power supply (UPS)
- 120 volts AC, emergency lighting

Utilization Voltages

Designers shall select from the following equipment voltages:

Fluorescent lighting	277 volts, single-phase
Emergency lighting	120 volts AC
Metal Halide lighting	120 or 208 volts, single-phase
Convenience outlets	120 volts, single-phase. NEMA 5-20R Minimum
UPS	120 volts, single-phase
Motor control	120 volts, single-phase
Motors, less than 1/2 HP	120 volts, single-phase
Motors, 1/2 to 300 HP	460 volts, three-phase

Voltage Drop

Steady-state voltage drop shall be calculated for all heavily loaded or long circuits of 500 feet or more from source to load. Calculations for motor circuits shall be developed on the basis of an 80 percent power factor. Designers must not exceed the following total voltage drops from the 480-volt source bus (excluding site distribution) to the feeder, branch circuit, and transformer:

Interior lighting	3 percent
Exterior/gallery lighting	5 percent
Motors	5 percent
Receptacles	3 percent
Electrical heaters	4 percent

The voltage drop shall be calculated for starting the motor if the motor exceeds 20 percent of the serving transformer capacity. The drop in voltage (flicker) shall meet the following limits:

Starts/Hr	Process Area Secondary (%)	Primary System (%)	Utility System (%)
1 or less	15	5	1
2 to 10	10	4	1
Over 10	8	3	1

Demand Factors

The designer must consider the following demand factors for sizing switchgear, panelboards, feeder breakers, feeder conductors, and transformers:

Service	Demand Factor
Lighting	1.0 x connected load
Emergency lighting	1.0 x connected load
Air conditioning equipment	0.8 x connected load
Ventilation equipment	0.8 x connected load
Pumps and ejectors	0.6 x connected load
Convenience receptacles	1.5 ampere, each

The connected load shall be used for sizing all branch circuits.

Branch Circuits

Connected load and NEC requirements must be used for sizing branch circuit breakers and conductors, except for motor loads. Designers shall follow these guidelines:

- A minimum wire size of No. 12 American Wire Gage (AWG) copper must be used for lighting and receptacle branch circuits. No. 10 AWG or larger shall be used if a larger conductor is required because of voltage drop.
- Lighting and receptacle loads must not be combined on the same branch circuit.
- The number of convenience receptacles on any one branch circuit shall be limited six duplex.

Utilization Equipment Identification

The following equipment will be identified:

- Motor control center
- Panelboard
- Distribution panelboard
- Switchboards
- Terminal junction boxes
- Transformers

All electrical equipment shall be provided with identification nameplates.

Other equipment may be identified if identification is required for other purposes; for example, junction boxes may need to be identified in order to route home run circuits through them.

Sequence numbers are required even if only one of a particular type of equipment is in a particular facility. For TJBs only, the sequence number will be followed by "A" for analog/electronic, "D" for discrete control, or "P" for power.

Major electrical equipment (i.e., MCC, SWBD, etc.) will be located on the site plan and the area plans in addition to the facility electrical plans.

Distribution System Equipment Preferences

The following types of equipment shall be used for low-voltage distribution systems: Low Voltage Switchboard: 100 percent rated, insulated case, individually mounted circuit breakers with solid-state trip for mains and feeders 400 amperes and larger. Smaller feeder breakers shall be molded case with solid state trips. See the manufacturer's data for additional information. Depending on the size and rating of the switchboard, back access may be required.

- Low Voltage MCC: Indoor, class II, type B wiring MCC shall be used. Supply circuit to MCCs shall be 480/277 volts, three-phase, 4-wire. MCCs shall have copper phase buses and a 400-ampere copper ground bus. MCCs shall be similar to General Electric model 8000. Overloads shall be nonambient-compensated unless such compensation is needed; for instance, at submerged pumps. MCC shall be 20" deep. All solenoid valves, thermal

devices, etc. that need to be operated when the motor is on shall be powered from the motor starter control power transformer (CPT). Where this is done, call out the need for additional CPT capacity on the control diagrams. Some spares and spaces should be allowed (on the order of 5 percent spares and 10 percent spaces) in addition to the identifiable spares required for known future equipment. Allow space for at least one future vertical section at each MCC.

- Low Voltage MCC Main Circuit Breakers: 100 percent rated molded case with solid state trips.
- Low Voltage MCC Branch Circuit Breakers (other than combination motor starters): molded-case thermal magnetic.
- Low Voltage Feeder Circuit Breakers in MCCs and Power Distribution Panelboards, 400-ampere and Larger: molded case solid-state trip, 100 percent rated. Smaller circuit breakers shall be molded case thermal magnetic.

Surge protective devices required at the main and for the panelboard that has outdoor branch circuits.

Equipment shall have adequate momentary and interrupting capacity to withstand fault currents that may occur where equipment is applied. Each circuit breaker located immediately downstream from the secondary main on a 480-volt secondary transformer shall be equipped with ground fault protection unless that circuit breaker is rated 200 amps or less. Each circuit breaker protecting a motor of 100 horsepower or more shall be equipped with ground fault protection. Ground fault protection on motors shall be instantaneous and ground fault protection on main breakers and feeder breakers shall be equipped with time delay setting and restraint systems.

Motor Protection and Control

Magnetic-only circuit breakers shall be provided as a branch circuit protection in motor starters for all motors 50 HP and smaller. Branch circuit protection for larger motors shall be provided by thermal magnetic breakers with adjustable magnetic trips. Motor control center type construction shall be used where multiple three-phase motors are located in the same general area.

Each motor shall be provided with thermal overload protection in all ungrounded phases. Controller-mounted relays shall have external manual reset.

For motors with motor starters as part of an integral package, the overload protection will be in the motor starter. For fractional HP equipment not normally requiring motor starters, manual motor starters with overload protection will be added. Some small equipment such as ceiling fans will have overload protection integral with the motors.

All motor control circuits shall operate at 120 volts and shall be supplied by individual control power transformers fused both in the primary and secondary sides.

Electrical motor starter control shall normally consist of indicating lights, pushbuttons, or switches.

All motors 25 HP and larger that are installed outside shall contain motor space heaters to minimize condensation. The space heaters shall operate on 120V and shall be energized when the associated motor is not in operation.

Provide winding thermal protection for motors and thermostats, thermistors with relays or RTDS/MPP depending on motor HP.

Panelboards

Distribution panelboards shall be 480/277-volt, three-phase, four-wire type with the main circuit breaker sized to match the supply transformer capacity. Lighting panelboards shall be 208Y/120-volt, three-phase, four-wire type with the main circuit breaker sized to match the lighting transformer capacity. To prepare and install panelboards, follow these steps:

- Flush mount panelboards in office or other finished areas.
- Provide separate panelboards to supply power to instruments and control panels where the equipment to be supplied requires a conditioned power supply. Where two 480-volt power supplies are available, an automatic transfer switch shall be provided to supply power to the lighting panelboard transformers from either 480-volt source. If feeder breakers are not local (near the transfer switch) provide disconnect switches in the same area to facilitate maintenance.
- Equip each panelboard with a minimum of 20 percent spare breakers with spaces, bus work, and terminations to complete the standard size panelboard.
- Show the circuit description, protective device trip rating, number of poles, rating of main lugs or main circuit breaker, neutral bus size, ground bus size, and interrupting rating of breakers on panelboard descriptions. Computer-generated panelboard schedules shall be included in the design.
- Prepare panelboard schedules using the standard format which, indicates circuit description, protective device trip rating, number of poles, load in voltamps by phase, rating of main lugs or main circuit breaker, conductor and conduit information for each branch circuit, neutral bus size, ground bus size, and interrupting rating of breakers.
- Provide a separate circuit breaker for instruments that perform the same function on parallel flow streams, such as Generator controls, fuel control instruments, etc. Instruments of different types that are all associated with the same flow stream may be connected to the same branch circuit to simplify the design.
- Identify all branch circuits or feeders on the drawings with the panel board and device protecting the individual circuit or feeder.

Motor Starter Selection

Unless required otherwise by the local utility, across-the-line starters shall be used for all motors smaller than 50 HP and shall be NEMA rated.

Standby Power Generation

Generator(s) shall be provided to power the vital loads at the facility. The vital loads to be powered are listed in Section 4.7.4, Specific Electrical Design Criteria. The bio-diesel generator shall be 480/277V three-phase, four-wire power and sized for the vital loads at the facility. The generator shall operate on bio-diesel fuel oil and shall be housed in a non-walk-in type enclosure, with a base tank. The engine generator shall include jacket water heaters, a voltage regulator, automatic starting batteries, battery charger, vibration isolators, automatic louvers, ventilation fans, an engine control panel, space heaters, and a base fuel storage tank.

The batteries shall be capable of starting the engine a minimum of three times without recharging. The battery charger shall have the capability of remotely indicating a failure to the plant Programmable Logic Controller (PLC). The fuel storage tanks shall be double-wall carbon steel. Leak detection shall be provided with the fuel tank. The fuel tank shall be sized to contain 72 hours fuel at 100 percent full load. Locate the leak detection system so that it is accessible for testing and maintenance.

The generator shall be sized to run all the vital loads at the facility. The maximum acceptable voltage drop upon starting any of the vital loads shall be 20 percent.

Convenience Receptacles

Convenience receptacles for general service shall be located as needed in Administration Building, Bus Maintenance and Bus Wash. In addition, provide receptacles at all air conditioning units and air handling units as required by NEC. Where washdown is expected, specify outlets to be located 48 inches above the floor so that weatherproof receptacles will not be required. All receptacles located outdoors shall be twist lock type and shall be ground fault protected.

Raceways

Specific types of raceway shall be chosen for use in various locations in the facility based on moisture, temperature, exposure to damage, corrosion, voltage, and cost. An underground duct bank consisting of concrete-encased, PVC conduits with galvanized steel "elbows" shall be provided for all circuits that are routed outside of buildings on the site. The following systems shall be grouped in separate ductbanks:

- Power wiring above 600 volts
- Power and discrete control wiring below 600 volts
- Process instrumentation analog and communication wiring, including 24-volt discrete signals, and intrinsically safe circuits shall be routed in steel conduit. Intrinsically safe circuits and computer circuits shall be carried through handholes and manholes in conduit. Provide separate circuits for telephone and computer circuits.

Duct banks shall include a minimum of two spare conduits. Underground raceways that are not installed in a duct bank shall be direct-buried, schedule 40 PVC conduit with galvanized steel "elbows".

The following general guidelines shall be used for raceway sizing, selection, and installation:

- Conduit shall be sized based on THWN insulation for sizes below No. 6 AWG, and THW insulation for all other wiring 600 volts and below.
- The minimum diameter of exposed conduit in all areas shall be 3/4 inch. Exceptions may be made for short distances from a junction box to a device which has a 1/2-inch knock-out provided by the manufacturer of the device.
- Concealed conduits shall not be smaller than 1 inch.
- Raceways in duct banks shall not be smaller than 2 inches.
- Raceways in walls and ceilings of control rooms, offices, and all areas with finished interiors shall be concealed.
- Embedded and buried nonmetallic conduits shall be converted to metallic conduit before exiting from masonry or earth and galvanized steel shall be used at all bends of 30 degrees or greater.
- The number of conduit bends shall be limited to an equivalent of 270 degrees on long runs.
- Exterior, exposed conduit shall be PVC-coated rigid galvanized steel.
- Exterior, underground, direct-buried conduit shall be schedule 40 PVC.
- Exterior, underground, concrete-encased conduit shall be schedule 40 PVC.
- Interior, concealed conduit shall be electrical metallic tubing (EMT) in frame construction and finished ceiling spaces. EMT fittings shall be of the compression type. Set-screw fittings are not acceptable.

Wire and Cable

For all lighting and power wiring of 600 volts and below, use stranded copper conductors.

The current carrying capacity of conductors shall be based on 75°C insulation ratings. Conductors No. 6 AWG and smaller shall have THHN/THWN insulation, larger conductors shall have XHHW insulation.

Individual No. 14 AWG conductors shall be used for discrete control circuits, unless it is practical to use multi-conductor cables to group control circuits.

Twisted-shielded pair control cable with 16 AWG individual stranded copper conductors and an aluminum Mylar tape shield around the pair shall be used for analog signals. Multi-pair cables shall be used where grouping of circuits is practical.

Cable Wiring

Television jacks for coaxial hook-up with nearby duplex power receptacle must be provided as indicated in the Room Criteria found in Section 6.3.1 or at Owner's direction.

Grounding

Panelboards shall be bonded to a grounding electrode, which may consist of a building steel column that is bonded to the underground rebar, or a made electrode system (triad or connection to ground loop around the building). In addition, ground rods shall be driven outside all buildings to supplement the ground electrode where required. Grounding electrodes of ground mats or embedded rods and cables will be specified to have a maximum resistance to ground of 3 ohms. Use 4/0 AWG copper conductor, minimum, for interconnecting ground rods and connection to transformers and switchgear.

The parts of all electrical equipment, devices, panelboards, and metallic raceways that do not carry current shall be connected to the ground conductors. The transformer neutrals of wye-connected transformers shall be solidly grounded through a grounding conductor connected to the grounding system.

A ground wire shall be installed in all raceways that contain power conductors at any voltage. The single exception is the medium voltage circuits that use shielded conductors or cable. These circuits will not have a separate ground conductor in the conduit.

Noise and transient occurrence is often caused by faulty grounds. Appropriate safeguards must be included to ensure grounding equipment is located at the proper places and not located where there should be none. Basic code requirements are referenced in the specifications. Grounding requirements should be included in the electrical drawings; field testing and inspection should be emphasized.

Lighting

Lighting levels in all areas of the facility shall be calculated following the procedures recommended in the Illumination Engineering Society (IES) handbook. Calculations for the foot-candle level resulting from the actual fixtures to be installed shall be documented. Where computer programs are used, the output from the program will be the documentation of the calculations. Ensure that selected fixtures and foot-candle levels are in compliance with the FBC Energy Code. In general, the following minimum foot-candle levels shall be provided:

<u>Area</u>	<u>Foot-Candle</u>
Offices, General administration	50
Service Bays	30
Machine Shop	30
Electronics Shop	30
Compressor	30
Maintenance Storage areas	20
Bus Wash	30
Storage, inside	10
Walkway	5
General site	1

The illumination levels for interior are average maintained values. Exterior and parking lots shall be minimum maintained at 1 footcandle with a 12:1 uniformity.

The following general types of light source shall be used to provide the proposed foot-candle levels:

<u>Area</u>	<u>Light Source</u>
Offices, General administration	Fluorescent
Service Bays, inside to 14 feet mounting height	Fluorescent
Service Bays, above 14 feet mounting height	High Intensity Discharge
Machine Shop	Fluorescent
Electronics Shop	Fluorescent
Compressor	Fluorescent
Maintenance Storage areas	Fluorescent
Bus Wash	Fluorescent
Storage, inside	Fluorescent
Walkway, inside	Fluorescent
Walkway, outside	High Intensity Discharge
General site	High Intensity Discharge

Where fluorescent lights are indicated, fixtures with energy saver ballasts and lamps shall be used.

Buildings with outdoor lighting will use luminaires with individual photocells. All luminaires will have individually fused ballasts. Site lighting must take into consideration operator's visibility at all gates and doors.

Lightning Protection: Provide lightning protection system for all the structures.

Miscellaneous Systems

Fire alarm systems shall be included in the building as required by applicable codes. Telephone jacks shall be provided in the office, repair shop, and scales.

Telephone System

Design/Builder is to provide space for the installation and power and wiring as required for Owner's voice system. This work shall be coordinated with the CITY's IT Department. The system may be installed on a backer board in the Electrical Room or Telephone Room especially designed for this purpose.

Although the Design/Builder is not to supply jacks, wiring or devices for computers or telephones, (2) ½" diameter conduits are to be provided (one conduit will be for computer wiring and one will be for telecommunications (voice) wiring,) with wire pulls at each of the following locations:

- Several locations in the Administration Building as indicated in Room Criteria found in Section 6.3.1
- Several locations in the Bus Maintenance area as indicated in Room Criteria found in Section 6.3.1
- One location in Bus Wash building (for wall mounted phone device)

Facility Computer System

The Design/Builder will make provisions for computers in the offices of the Administration Building, the Operations Report Room, Mechanics Records/Manuals, Farebox, Training Rooms, Common Work Room, Parts Room, Service Bays and elsewhere as directed by Owner. This work shall be coordinated with CITY's IT Department. Multiple desk-top units may be required in some locations. The appropriate wiring will be provided within each space and from the Telephone Room so that multiple PC units may be hooked to the corporate server, have e-mail capability and internet access. Printers will be shared, as directed by Owner.

Special Outlets/Power Requirements

The Design/Builder is to provide convenience outlets in all full height backslash cabinet locations.

Additional outlets will be required as directed for Break Rooms for a refrigerator, icemaker, microwave, coffee service unit, etc. as per Owner's requirements.

Toilet Rooms will be provided with one outlet by the sink with a ground fault duplex receptacle.

Shower Rooms will be provided with one outlet, outside the shower enclosure, with a ground fault duplex receptacle. Coordinate location with architect.

Machine Shop will have convenience and equipment duplex outlets provided at the work bench level for special tools and as required by Owner.

6. Specific Design Criteria

6.1 Introduction

This section defines the specific design criteria of the Key West Public Transportation Facility. In addition to the requirements presented herein, the facility shall be designed and constructed in accordance with the Technical Requirements presented in Section 5. Specific issues are addressed in this section, but are not meant to be all inclusive. Therefore, the Design/Builder is ultimately responsible for determining the full range and impact of applicable design-build criteria. Also, the Design/Builder is responsible for obtaining all of the final endorsements from federal, state, and local government agencies.

6.2 Site/Civil

6.2.1 Introduction

This section addresses the requirements and standards that may apply to the site design, provides a description of the existing and future site conditions, storm water management system, sanitary sewer, water distribution system, security requirements, erosion and sedimentation control, landscaping, and roadway and parking requirements for the City of Key West Public Transportation Facility (PTF).

6.2.2 Existing Site Conditions

The site is located on Stock Island, Key West, Monroe County, Florida, Section 27, Township 67S, Range 25E (5701 College Road.) The site is on the northwest side of College Road, adjacent to the former landfill site. It is approximately 3.9 acres in size. Currently, the topography of the site generally ranges from an elevation 6 feet above mean sea level (msl) to an elevation 14 feet above msl. Current existing conditions are presented in Appendix A.

The proposed site was previously used as a solid-waste-to-energy facility.

There are several existing structures on the site, which are to be demolished: Ash Transfer Building, Shed, Building, Resource Recovery Plant, Elevated Structure, White Goods Storage. Refer to Section 4 and Appendix E. There is also a scale house with scale, tanks, and a shredder that will be removed. The majority of the site is covered with asphalt paving. An electrical transformer and electrical equipment near College Road will remain. Existing fire pump should be evaluated for reuse, but the Design-Builder will be ultimately responsible for meeting fire flow requirements. An existing art piece (large stainless steel shark) located onsite is to be salvaged/relocated and re-installed into/displayed as part of the project design (See Sheet C-01) near the front of the proposed new building. Existing trees and vegetation are to be removed, with the exception of selected coconut palms, Christmas palms, and thrinax which are to be transplanted, and selected mahogany trees which are to be transplanted or remain. Monitoring wells and gas monitoring probes will need to be furnished and installed by the Design-Builder as shown on Sheet C-01.

Examination of the current Federal Emergency Management Agency (FEMA) Flood Zone Maps revealed that the site is located in Zone VE, which is an area subject to flooding by 100-year flood. The base flood elevation is 11.0 feet (NGVD 1929), as obtained from the FEMA Flood Map (#12087C1528K.) Therefore, the minimum finish floor elevation for buildings and structures required is 12.0 feet msl, or 1 foot above the base flood elevation. Per FDEP condition on the approved demolition plan, the site will require 2 feet of clean fill. The FFE was raised to 12.5 feet msl in an effort to reduce the amount of hauling required.

According to the Soil Survey of Monroe County, Florida, the site is classified as Urban Land. The wet season water table ranges from a depth of 5 feet bgs. The wet season is from June to November.

The site is located within a “Public Services” zone. The property setback requirements are as follows:

Front Yard:	20 feet
Side Yard:	15 feet
Rear Yard:	20 feet

More details and requirements for land development can be found in the City of Key West Code of Ordinances. The City has applied and been approved for a City of Key West Major Development Permit. The Design/Build team will need to substantially comply with the approved Major Development Permit. Any substantial deviations from the Major Development Permit will be the responsibility of the Design/Build team to secure approval.

6.2.3 Site Improvements and Proposed Facilities Layout

The overall site plan is as shown on Drawing C-01 found in Appendix A. It will consist of the following structures and facilities:

- Administration Building
- Bus Maintenance Area
- Bus Wash
- Emergency Generator
- Fuel Island – Storage and Dispensing
- Maintenance Line Parking
- Bus Parking
- Employee Parking
- Maintenance Vehicle Parking Area
- Storm Water Management System

According to the May 2008 *Report of Geotechnical Exploration*, prepared by Nutting Engineers of Florida, Inc., and provided as Appendix C, the existing soil conditions generally consist of a:

“two- to six-foot surface layer of medium dense to dense tan silty sand and limestone fragments fill material underlain by a two- to five-foot stratum of dark gray to brown silty sand with some organic silt and varying amounts of garbage debris to a depth of nine feet. Some debris was observed to consist of trace wood, plastic, glass, tile and other unknown materials. Below the debris zone hard to refusal light tan limestone with trace sand was encountered to a depth of thirty feet, the maximum depth explored.”

We note that the silty sand and debris was observed to be thicker in the [proposed] area of the bus-wash and fuel island area averaging four- to five-feet in thickness, while in the approximate office/service bay area the debris was only two- to three-feet in thickness.

Note: Substantially different subsurface conditions may exist at intervening locations between soil borings.”

Therefore, subgrade preparation will be required according to the procedures presented in Section 6.2.10.

The site is located on an interior parcel that can be accessed directly via College Road. Entrance to the site shall be at the southeast side of the property. The entrance will be controlled by a sliding gate. Two entrances will need to be provided to the northwest of the project to the maintenance road of the landfill.

The existing site topography and FEMA requirements will cause all buildings constructed on this site to be elevated above the base flood elevation. For this reason the site will need to be filled and graded to provide the required floor elevations. A combination of retaining walls and earthen berms will be needed. However, due to the cost of retaining walls, natural soil grading with vegetation and drainage friendly slopes will be used as much as possible.

The functional aspects of the Bus Maintenance Area and the Bus Wash will require vehicular access at the finished floor elevation (+12.5 feet msl).

Other appurtenances on the site shall be graded appropriately to facilitate their function. The emergency generator, located adjacent to the Bus Wash Building, and the fuel storage facility must be built above the base flood elevation and be accessible for fuel delivery trucks.

The Design/Builder shall optimize utilization of the site, accounting for zoning setback requirements and following the City of Key West Code of Ordinances.

Recommendations from the Geotechnical Report for general site preparation, excavation and trench excavation work shall be incorporated. Materials for fill, backfill, and trench backfill shall conform to the recommendations of the Geotechnical Report as required by this criteria package. All excavations shall be supported as required by Occupational Safety and Health Administration (OSHA) guidelines.

6.2.4 Stormwater Management System

Adequate storm sewer facilities and stormwater management facilities shall be provided as required in the Site/Civil Design Criteria and this section. Natural drainage patterns from external areas that affect the site must be taken into account.

A stormwater management system shall be designed and constructed on the property to collect, convey, treat, hold, inhibit or divert surface water, while limiting disruption of natural hydrology. The stormwater management system shall consist of conveyance structures such as catch basins, inlets, manholes, and ditches; stormwater retention and/or detention ponds; oil/water separators; and outfall structures. Impervious cover should be minimized where possible. Consideration should be given to implementing a stormwater management plan as outlined in the LEED Reference Guide, Sustainable Sites Credits 6.1 and 6.2, Stormwater Design – Quantity Control and Quality Control, respectively.

The new stormwater management system will be evaluated on the ability of the system to prevent flooding of on-site structures, adjacent properties, roads, and road rights-of-way based upon antecedent rainfall conditions. The stormwater management system will be designed and permitted based on requirements set by the SFWMD and FDEP, and will conform, at minimum, to the drainage level of service standard defined by the City of Key West Code Section 94-69. An ERP modification has been submitted to and approved by SFWMD (Permit No. 44-000076-S) [Appendix D].

6.2.5 Sanitary Sewer System

The existing septic system on site utilized for sanitary sewer disposal will be disconnected and demolished as required by Monroe County mandate. Key West Resort Utilities (KWRU) currently provides wastewater collection and treatment services within the area of the proposed project and has been contacted regarding the intent of the PTF to connect to their system. The Design/Builder will coordinate with KWRU to secure final approvals for sanitary sewer collection and treatment prior to construction. This work will require an onsite pump station with an offsite forcemain.

6.2.6 Water Distribution System

It is the Design/Builder's ultimate responsibility to provide water for potable use and fire protection for the site, in accordance with all applicable codes. As a minimum, potable water will be required at the Administration Building, Bus Maintenance area, and Bus Wash, with several hose bibs available at various locations. If required, potable water will be needed for fire protection at the numerous areas of the facility and fire hydrants on site.

Currently, the site is serviced with potable water by the Florida Keys Aqueduct Authority (FKAA) with a three-inch portable water service line and a fire line. The existing 3" service line is connected to a 10" water main located in front of the site. FKAA has been notified of the proposed project and has determined available capacity can service the project with existing infrastructure currently in place. The Design/Builder will coordinate with FKAA to secure final approvals for potable water service prior to construction.

6.2.7 Security Design Criteria

The proposed site will require a perimeter fence along the property line and a control operated gate. The security fence material, location, and installation shall comply with City of Key West Code of Ordinances.

The fence material will be, at a minimum, galvanized steel chain link fence with galvanized steel frame with top rails, at least 6 feet high, with three strands of barbed wire at the top. Fabric shall be 2-inch diamond mesh of 9-gauge wire and will conform to the requirements of Type 1, AASHTO M-181. All galvanized steel posts, rails, braces and expansion sleeves shall meet the requirements of AASHTO M-181. Steel posts will be set in concrete bases. The entrance will have an automatically-operated, industrial, sliding gate.

6.2.8 Erosion and Sedimentation Control

The FDEP and SFWMD require erosion and sedimentation control measures for all construction activities. The requirements are based on best management practices to prevent onsite silt from migrating off the construction site. The Design/Builder shall implement an Erosion and Sedimentation Control Plan conforming to the requirements of the 2003 EPA Construction General Permit or local standards (whichever is more stringent,) to be approved by the FDEP, City of Key West, and any applicable federal agency. The Plan and implemented measures shall also fulfill the requirements outlined in the LEED Reference Guide, Sustainable Sites Prerequisite 1, Construction Activity Pollution Prevention.

Sediment and erosion control measures shall be in place prior to any land disturbance activity.

6.2.9 Landscaping

Landscape all areas not paved or occupied with structures, to provide vegetated open space equal to at least 20% of project's site area. See LEED Reference Guide, Sustainable Sites Credit 5.2, Maximize Open Space.

Landscaping shall be designed to contribute to LEED Sustainable Sites Credit 7.1, Heat Island Effect – Non-Roof, by providing shade for at least 50% of site hardscape areas within five years of occupancy. A combination of strategies may be utilized to affect 50% of the site hardscape; see Section 6.2.10 Roadways and Parking Areas.

The landscaping must comply with all federal and local regulations, and must be comprised primarily of native or adapted species that will require no permanent irrigation system or one which uses only captured rainwater, recycled wastewater or gray water, or water treated and conveyed by a public agency specifically for nonpotable uses for irrigation, as outlined in LEED Reference Guide, Water Efficiency Credit 1, Water Efficient Landscaping. If temporary (up to one year) irrigation is required, for plant establishment or soil stabilization, Design/Builder shall provide.

Provide permanent soil stabilization, which will not require a permanent irrigation system.

The Design/Builder will be fully responsible for all landscape maintenance and replacements for the duration of the Contract.

The Design/Builder shall maintain documentation of all landscaping activities which contribute to LEED Certification.

6.2.10 Roadways and Parking Areas

Site roads and parking areas shall be designed and constructed in accordance with federal and local regulations. Due to site grading issues, roads shall be designed taking into account the types of vehicles using the facility.

Visitor's parking is required at the Administration Building. A minimum of six parking spaces, one of which is ADA-compliant, shall be provided. Separate parking will be provided for personnel and maintenance vehicle parking: thirty-two regular, plus two accessible spaces, or the number required by City of Key West and/or in substantial compliance with the approved City of Key West Major Development Permit approval and any applicable federal and local requirements, without exceeding the number required. Three scooter-parking spaces and secure bicycle parking, for a minimum of twelve bicycles, will also be provided. Preferred parking will be designated for low-emitting and fuel-efficient vehicles, and for car/van pools. Refer to the LEED Reference Guide, Sustainable Sites Credits 4.2 through 4.4, pertaining to Alternative Transportation.

Five bus parking spaces will be provided at the maintenance line, and sixteen additional spaces will be provided for overnight/extended bus parking.

Consideration should be given to the use of permeable surfaces for parking and other hardscape elements where feasible, to increase on-site infiltration, reduce stormwater runoff, and reduce the heat island effect. Paving and hardscape materials with a Solar Reflectance Index (SRI) of at least 29 are also preferred in order to reduce the heat island effect. See LEED Sustainable Sites Credit 7.1, Heat Island Effect – Non-Roof.

As a minimum, the following subgrade preparation and surcharge for the roadways and parking areas shall be performed.

6.2.10.1 Excavation, Proof-rolling, and Backfilling

- The existing subgrade shall be a minimum of LBR 40. Contractor shall bring necessary fill material to meet LBR 40.
- Before placing granular fill, the bottom of the excavation shall be proof-rolled with at least 15 overlapping passes using a 10-ton or heavier vibratory roller. The upper 12 inches of the bottom shall be compacted to at least 95 percent of the soil's maximum dry density as determined by ASTM D-1557. Any areas that cannot be densified in place shall be excavated to firm the soils, and backfilled with granular fill.
- The granular fill shall consist of 1.5 inches minus, well graded, crushed limestone, gravelly sand, sandy gravel, or sand classified as GW, GP, or SP in accordance with Unified Soil Classification system (ASTM D-2487).
- The granular fill shall be placed in 6-inch lifts and compacted to at least 95 percent of the maximum dry density as determined by ASTM D-1557.

6.2.10.2 Site Surcharge

After the excavation, proof-rolling, and backfilling, the proposed roadways and parking areas shall be surcharged with earth fill. The surcharge shall be placed to at least 5 feet above the finished grade of the roadways and parking areas and shall be extended to at least 5 feet beyond the perimeter of the roads and parking areas. Settlement platforms and bench marks shall be installed to monitor the settlements. The surcharge material shall be removed only after the monitored settlements have reached a steady state.

6.3 Architectural

6.3.1 Introduction

The design criteria identified in this section shall be utilized as the basis of the program and requirements for each of the buildings required for this facility for the City of Key West. Specifications stated herein are not to be interpreted as all-inclusive and the Design/Builder shall exercise due diligence in confirming the suitability of building components as they relate to this project.

The architectural requirements of the following elements of the PTF are further described below:

- Administration Building
- Bus Maintenance
- Bus Wash
- Fuel Island

6.3.1.1 Administration Building

The Administration Building shall be approximately 7,800 gross square feet, occupying two stories, in a footprint 100 feet by 46 feet. The building houses Operations offices and maintenance support functions on the first floor and Administration offices on the second.

The structure will have a concrete floor slab supported by engineered piles and grade beams. The building finished floor elevation shall be +12.5 feet. Roofing panels shall be standing seam metal on pre-engineered metal trusses. Exterior walls shall be constructed primarily of reinforced concrete masonry, with impact-resistant windows and doors. The building will be air conditioned.

The program for this building is comprised of four components: Administration, Operations, Bus Maintenance Support and shared Utility/Support. The following table summarizes approximate space and general requirements. Detailed requirements for each space, i.e. location of telephone/data connections, card reader access, equipment, etc., must be coordinated with the Owner.

The Administration area, on the second floor, includes the Director's/Manager's Office, Grants Coordinator Office, Customer Service Specialist Office, Accountant Office, a dividable Training/Conference Room, Break Room, Common Work Area, Files storage, Supply Storage, and two single-user Toilet Rooms.

The Operations area, on the first floor, contains the Reception/Waiting/Entry (primary/visitor's entrance to building,) Operations Supervisor's Office, Shift Supervisor Office, Dispatcher, Operator (Ops) Report Room, Fare Box Computer/Cannister Storage, Lockers with dual access from Operations Corridor and Service Bays, Uniform Holding, Office Support Equipment/Supply Storage, Break Room (shared with Bus Maintenance), and two single-user Toilet Rooms.

The Bus Maintenance Support area will include the Maintenance Foreperson's Office, Mechanics Records/Manuals and Computer Station, Parts Room. There will be direct access from these areas to the Service Bays in Bus Maintenance and access to the Operations area through the Parts Room. Locker/Toilet/Shower Rooms will also be provided: 1 men's, 1 women's, each with two showers (one accessible,) changing space with two temporary-use lockers and a bench, and a minimum of one toilet stall which shall be fully compliant with the Florida Accessibility code.

General Utility/Support areas may be on the first or second floor, and include a Server/Telephone Room, Mechanical room with exterior access, Electrical/Telephone closets located to accommodate back-up generator connections into building, Elevator Machine Room, Janitor's Room, and designated recycling areas. Recycling collection and storage areas shall be designated throughout the facility and sized as required; 125 sf (aggregate) is suggested for a commercial building between 5,000 and 15,000 sf. See LEED Materials and Resources Prerequisite 1, Storage and Collection of Recyclables.

See Figure 5-3-1 for details.

6.3.1.2 Bus Maintenance

The Bus Maintenance area is a one-story structure of about 7,500 gross square feet, with approximate dimensions of 100 feet by 75 feet, immediately adjacent to the Administration Building. The service bays occupy 5,100 sf, while the remaining space houses a machine shop, support and storage functions.

The structure will have a concrete floor slab with integral trench drains, supported by engineered piles and grade beams. The building finished floor elevation shall be +12.5 feet. The roof will be supported on a pre-engineered metal framing system. Exterior walls shall be constructed of reinforced concrete masonry or cast in place concrete, up to a height of eight feet, with metal panel over metal framing above. Impact-resistant windows and doors will be utilized. Most of the building will not be air conditioned, but will be mechanically ventilated. The machine shop portion of the building shall be separated from the other spaces of the building with a concrete unit masonry wall for fire separation, acoustical and functional reasons. The machine shop will be ventilated and shall be designed according to code so that welding operations can occur in the space.

Six, 800 sf service bays are contained in an area approximately 100 feet by 48 feet, in a three wide by two deep configuration. Overhead doors will be provided at each bay (six, total.) The Bays will be designated according to function, with specific requirements for each, including specialized vehicle lifts, engine hoists, and overhead/pulldown tool access. An emergency eyewash and shower will be provided along the edge of the service bays, near the Machine Shop. A minimum of two personnel egress doors shall exit directly to exterior.

Service support will include a Machine Shop, Lubricant Storage, Non-Hazardous Waste Storage, Compressor room, Battery Room, Electronics Shop, Equipment Storage, and Tire Storage. Provisions for exterior storage of used lubricants shall be convenient for access by removal service.

See Figure 5-3-1 for details

Room	Approx. SF Required'	Exterior Window / Door Required	Overhead Door	Telephone / Data Connections Required	Equipment
<i>Bus Maintenance</i>					
Service Bays	5000	yes	6/to ext	yes	vehicle lifts, security camera, emerg eyewash, emerg shower
<i>Bus Maintenance - Service Support</i>					
Machine Shop	300	yes/double	1/to ext	yes	security camera, card reader access, 2 hose bibs, welding station, service sink
Lubricant Storage	200	yes/double	1/to ext		
Non-hazardous Waste	200		1/to svc bay		
Compressor	160		1/to svc bay		air compressor
Battery Room	140	yes/double		Tel	battery stor. racks, sec camera
Equipment Storage	75		1/to svc bay		
Electronics Shop	150			yes	security camera, card reader access
Tire Storage	600		1/to ext	yes	tire racks, security camera
Service Corridor	140				
Subtotal	6965				
<i>Administration Building - Bus Maintenance Support</i>					
Mech Rec/Manuals	160	window		yes	window to service bays
Maint Foreperson	120	window		yes	window to parts room
Parts Room	500	int window		yes	security camera, hd shelving, lockable cabinets, workstation for 1 PC, card reader access
Mens T/S/L	275				2-4 lockers, bench
Womens T/S/L	275				2-4 lockers, bench
Lockers Corridor	150				
Subtotal	1480				
<i>Administration Building - Utility/Support</i>					
Stair 1	160	yes			
Elevator Machine Room	50				
(Elevator)	60			Emerg Tel	
Stair 2	160	yes			
Telephone	40				
Electrical	40				
Mechanical	115	yes/double			
Maintenance Foyer	140	yes			
Server/Telephone	200			yes	card reader access
Janitor	35				mop sink, shelf/rack
Subtotal	1000				

Figure 5-3-1

Room	Approx. SF Required ¹	Exterior Window / Door Required	Overhead Door	Telephone / Data Connections Required	Equipment
<i>Administration Building - Operations/1st Floor</i>					
Operations Supv	205	window		yes/multiple PCs	
Shift Supervisor	115	window		yes	
Dispatcher	115	window		yes	radio/comm console
Reception/Waiting/Entry	175	yes/double		Tel	security camera
Ops Report Room	350	window		yes	forms rack, work counter
Farebox	105	transaction/ deposit window		yes	security camera, card reader access
Ops Lockers	300			Tel	40-50 2-tier lockers, benches
Uniform Holding	65				shelves, hanging racks, card reader
Ofc Support Equip Stor	65				shelving
Break Room 1	200	window		Tel	ref, ice, sink, micro, H2O cooler, CATV
Mens Room 1	55				
Womens Room 1	55				
Ops Corridor	600				time clock
Subtotal	2405				
<i>Administration Building - Administration/2nd Floor</i>					
Directors Office	220	window		yes	
Grants Coordinators Ofc	120	window		yes	
Accountants Ofc	120	window		yes	
Customer Svc Specialist	120	window		yes	security monitoring
Training 1	400	window		yes/2 each	flatscreen monitor, dry erase board, CATV
Training Storage	50				shelving/cabinets
Training 2	400	window		yes/2 each	flatscreen monitor, dry erase board, CATV
Break Room 2	200	window		Tel	ref, ice, sink, micro, H2O cooler, CATV
Common Work Room	150	window		yes	
Files Storage	125				
Supply Storage	100				shelving
Mens Room 2	50				
Womens Room 2	50				
Admin Corridor	750	yes/to loggia			
Subtotal	2855				
Loggia (Exterior)	525 ²				
Net SF Subtotal	14705				
NSF:GSF Multiplier	1.15				
Gross SF	16910.75				
<i>Bus Wash</i>					
Bus Wash	2100 ²	yes	2	Tel	coord with wash system manuf

¹Actual SF may vary

²Approx. 2100 needed according to bus-wash system manufacturer's schematic drawings

³Not included in SF totals

Figure 5-3-1, cont'd

6.3.1.3 Bus Wash

The Bus Wash building will be approximately 2,100 gross square feet and will be dimensioned to accommodate a pre-manufactured, automated, drive-thru wash system. The structure will have a concrete floor slab, supported by engineered piles and grade beams. The building finished floor elevation shall be +12.0 feet. The slab should have a concrete pit and integral trench drains as specified by the bus-wash system manufacturer. The roof will be supported on a pre-engineered metal framing system. Exterior walls shall be constructed of reinforced concrete masonry or cast in place concrete, up to a height of eight feet, with metal panel over metal framing above. Dimensions, mechanical, electrical, plumbing, and additional requirements must be coordinated with bus-wash system manufacturer prior to commencement of construction documents, and may include, but not be limited to, settling pit, ventilation system, water lines with associated piping and appurtenances, electrical conduit, switches, receptacles, junction boxes and connectors.

6.3.1.4 Fuel Island

A Fuel Island will be provided, with above-ground storage and dispensing capabilities, for bio-diesel fuel. Steel bollards will be provided to protect the tanks from vehicle-related damage. An emergency shut-off system shall be provided in a remote yet convenient location. See Site/Civil, Structural, Mechanical, Fire Protection, and Electrical Sections for further information.

6.3.2 Conceptual Space Plan

Conceptual plans illustrating the general arrangement of the buildings described above can be found in Appendix A.

6.3.3 Architectural Design Criteria

The design of the facilities shall follow the architectural guidelines herein. Materials and finishes not identified in this document may be considered during design/construction, provided that: (a) design integrity is maintained, (b) the alternatives meet all design requirements identified in this document, (c) proof of equivalency is provided by Design/Builder, and (d) the alternatives are acceptable to the CITY.

All materials shall be judiciously selected with regard to recycled content, recyclability, regional availability, efficiency of use, low-emissivity, and minimal waste generation. Refer to the LEED Reference Guide for additional guidance.

6.3.3.1 Exterior Walls

Any or a combination of the following two options for the walls of the buildings shall be used:

- Option 1: Concrete Masonry Units and Cast-in-place Concrete
- Option 2: Insulated Metal Panel System, Concrete Masonry Units and Cast-in-place Concrete

Option 1 is preferred for the Administration Building, while Option 2 is preferred for the Bus Maintenance portion of the building and the Bus Wash shell building.

Exterior walls will be insulated to an R-value of 30 in air-conditioned spaces.

6.3.3.2 Interior Partitions

Use concrete masonry units (CMU) for all interior partitions throughout the Bus Maintenance Service Support areas. The walls will be rated as required by Florida Building Code.

CMU shall also be used to construct the elevator hoistway and walls around egress stairs, rated as required by Florida Building Code.

Use a minimum 3 5/8 inch deep metal studs and 5/8 inch gypsum board for walls not required to be constructed of CMU.

For non-wet areas, paint gypsum board walls with low- or no-VOC (less than 100g/L for non-flat finish,) latex, semi-gloss paint.

Finish walls of the janitor's, toilet, shower, and locker rooms with full-height porcelain/ceramic tile, using thinset application onto cementitious or glass fiber backer board (substrate only,) in accordance with TCA (Tile Council of America) specifications. Provide sound insulation within the walls around these areas.

Sound attenuation shall be used in the partitions as required for acoustic separation, including but not limited to, offices, work areas, and training rooms. Sound attenuation shall achieve a minimum STC rating of 50 dB around Mechanical Room, and between Service Bays and Administration/Operations areas. Sound attenuation shall be located on the underside of the roof or wrap over the ceilings on both sides of partitions for a minimum distance of 6 inches.

6.3.3.3 Roofing

Roofs shall be standing seam metal. Roofing materials shall have an SRI of at least 29 for a steep-sloped roof (>2:12,) or at least 78 for a low-sloped roof (\leq 2:12,) as outlined in the LEED Reference Guide, Sustainable Sites Credit 7.2, Heat Island Effect – Roof. Provide minimum R-40 roof insulation for the Administration and Bus Maintenance Building. Provide minimum R-11 insulation for the Bus Wash building.

6.3.3.4 Louvers

Use aluminum louvers with a factory-applied, baked enamel finish, with bird screens; louvers must meet the Florida Building Code for wind pressures and impact.

6.3.3.5 Ceilings

For ceilings in the janitor's closet, and toilet/shower areas, use suspended gypsum board ceiling with textured finish. Use water-resistant gypsum board. Gypsum board ceilings shall be painted with low- or no-VOC (less than 100g/L for non-flat finish,) latex, semi-gloss paint.

Hallways, Break rooms, Training rooms, Office/work areas shall receive suspended acoustic tile ceilings.

Soffits, where required, shall be gypsum wall board over metal studs.

Utility and Service Support areas may have exposed ceilings where fire protection, sound attenuation, or other requirements are not present.

Where required, sound attenuation shall be located on the underside of the roof or wrap over the ceilings on both sides of partitions for a minimum distance of 6 inches.

6.3.3.6 Doors

For exterior doors, use steel, hollow metal doors and frames, painted for corrosive salt environment, such as 1 coat epoxy primer, 1 coat polyamide high build epoxy and 1 coat polyurethane enamel. Anti-corrosive coatings may not exceed 250g/L VOC content. Appropriate saddles and weatherstripping are to be provided for each exterior door to protect against driving rain. Door stops will be provided where applicable. Rated doors and frames will be used where required by code. Doors provide door closers at exterior and rated locations.

Interior doors shall be wood or hollow metal, fire-resistance rated where required.

Hardware

Owner shall be consulted regarding keying system. Master keying will be provided as part of the keying system.

Hurricane/Impact Assemblies: For all exterior doors, the hardware must be certified by Miami/Dade Certificate of Compliance or other independent testing certification as part of a hurricane/impact resistant door and frame assembly.

Specialized requirements for door hardware should be coordinated with the Owner and reviewed by a door hardware specialist or consultant. Standard hardware configurations by type of space are as follows:

- Shower Rooms/Toilet Rooms: Privacy lock and closer
- Break Rooms, Locker Room: Push/pull and closer
- Shops (Bus Maintenance Support) and Shop Storage areas, Janitor: Storage room lock and closer
- Training Rooms and Offices: Classroom lock
- Electrical/Telephone, Mechanical, Files, General Storage: Storage room lock.

6.3.3.7 Windows

Use aluminum windows with factory finish. Provide impact resistant glazing for all exterior windows. Fit exterior windows with tinted, insulated, low-e glazing. Window assemblies, including components, framing, and attachment methods, must meet impact resistance requirements in accordance with current FBC.

Hurricane protective shutters may be substituted for impact glazing with Owner approval. Owner approval required to substitute shutters for impact glazing.

6.3.3.8 Flooring

An under-slab vapor retarder shall be installed under all floors which shall be in air conditioned spaces and placed on grade. In containment areas, provide a sealer that is chemically compatible with the use.

Acceptable floor finishes include sealed concrete, polished concrete, porcelain tile, linoleum/linoleum tile, Vinyl composite tile, and carpet tile. All interior flooring materials must comply, as applicable per material, with the following:

1. Carpet: Carpet and Rug Institute Green Label Plus program
 2. Carpet cushion: Carpet and Rug Institute Green Label program
 3. Carpet adhesive: VOC content no more than 50g/L
 4. Hard surface flooring: FloorScore standard
 5. Floor stains/sealers/finishes: South Coast Air Quality Management District (SCAQMD) Rule 1168, Architectural Coatings, January 1, 2004
 6. Tile setting adhesives and grout: SCAQMD Rule 1168, VOC limits July 1, 2005/amendment January 7, 2005
7. Use of vinyl composite tile may affect LEED points.

6.3.3.9 Elevators

One, 2,500 lbs. (minimum) capacity elevator will be provided in the Administration building. The minimum interior dimensions shall be 80 inches wide by 51 inches deep, with a front, centered entrance. Standard interior height and standard clear opening heights are acceptable. See Section 5.3.1.1 for Architectural Technical Requirements.

6.3.3.10 Casework

Cabinet and drawer design will be flush overlay with stainless steel wire pulls; all shelves shall be adjustable, drawers will have full extension. Base cabinets will have adjustable shelves, doors, and drawers. Countertops shall be plastic laminate and shall be accessible in accordance with ADA. Stainless steel countertops may be used at service or maintenance locations in lieu of plastic laminate. Back splashes shall be full height plastic laminate and with recessed convenience outlets. Overhead cabinets will have under cabinet lighting and adjustable shelves, with top of overhead cabinets at 7 feet, 0 inches. For all casework, use AWI Custom level of construction with Formica, Nevamar or Wilsonart plastic laminate over wood/composite wood; composite wood and laminating adhesives must contain no added urea-formaldehyde resins, as outlined in LEED Indoor Environmental Quality Credit 4.4, Low-Emitting Materials - Composite Wood and Agrifiber Products.

6.3.3.11 Toilet and Bath Accessories

Ensure that toilet and bath accessories meet all ADA requirements. Provide blocking behind all accessories as required for secure installation. Provide only stainless steel brush finish toilet and bath accessories. Toilet-stall material to be phenolic and vandal resistant type. The accessories in the space will include a soap dish, mirror, grab bars in accessible stalls/toilet rooms, towel dispenser, waste disposal, and toilet paper dispenser. Women's toilet rooms/stalls will have sanitary napkin disposal and coat hook. Doors will have a closer and for single-user toilet rooms, a privacy type lock.

For each shower provided, accessories shall include soap holder, shower rod, shower curtain, towel rod/hook and robe hook; install grab bars and seat as required in accessible showers.

6.3.3.12 Architectural Coatings

Ensure that all exposed building surfaces, including all structural steel framing and decking, are properly coated. All adhesives, sealants, primers, paints, coatings, stains, finishes, and shellacs used on the interior of the building shall comply with the requirements of the LEED Reference Guide, Indoor Environmental Quality Credits 4.1 through 4.4, pertaining to Low-Emitting Materials.

Suggested architectural coatings are listed below; inclusion herein does not imply compliance with all applicable standards, nor is list all-inclusive. The Design/Builder shall provide additional coating systems as required.

Galvanized Metal

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP-1) Followed by Hand Tool (SP2) or Power Tool (SP3)	Wash Primer or Coating per Manufacturer's Recommendation OR Primer, Galvanized, Water Based (MPI#134 or 134-X Green/VOC Range E-3)	1 coat, not less than 1.2 mils dry film thickness (MDFT)
	Acrylic Latex, Semigloss (MPI#11 or 11-X Green/VOC Range E-3)	2 coats, not less than 2.6 MDFT

Metal Trim and Structural Steel

Surface Prep.	Paint Material	Min. Coats, Cover
Near White Blast Cleaning (SP 6)	Primer, Epoxy, Anti-Corrosive for Metal (MPI#101/VOC Range E-3)	1 coat, not less than 1.3 MDFT
	Epoxy, High-Build, Gloss (MPI#98/VOC Range E-3)	2 coats, not less than 2.6 MDFT

Concrete Masonry

Surface Prep.	Paint Material	Min. Coats, Cover
Masonry	Block Filler, Latex Interior/Exterior (MPI#4 or 4-X Green/VOC Range E-3)	1 coat, not less than 4.0 MDFT
	Acrylic Latex, Satin/Low Sheen (MPI#15 or 15-X Green/VOC Range E-3)	2 coats, not less than 2.3 MDFT

Concrete or Masonry Sealer

Surface Prep.	Paint Material	Min. Coats, Cover
Concrete or masonry	Primer, Alkalai Resistant, Water Based (MPI#3/VOC Range E-3)	2 coats, not less than 2.3 MDFT

Exterior Gypsum Board and Plaster

Surface Prep.	Paint Material	Min. Coats, Cover
Remove all Oil, Grease & Loose Particles	Primer, Alkalai Resistant, Water Based (MPI#3/VOC Range E-3)	1 coat, not less than 1.5 MDFT
	Acrylic Latex, Satin/Low Sheen (MPI#15 or 15-X Green/ VOC Range E-3)	2 coats, not less than 2.3 MDFT

6.3.4 Project Finish Schedule

KEY WEST PUBLIC TRANSPORTATION FACILITY							
Finish Schedule							
Space	Floor	Base/Wainscot		Walls		Ceiling	
		Material	Height	Material	Finish	Material	Height
<i>1st Level</i>							
Machine Shop	SCON	n/a		CMU	PT	EXP	EXP
Lubricant Storage	SCON	n/a		CMU	PT	EXP	EXP
Non-hazardous Waste	SCON	n/a		CMU	PT	EXP	EXP
Compressor	SCON	n/a		CMU	PT	EXP	EXP
Battery Room	SCON	n/a		CMU	PT	EXP	EXP
Electronics Shop	SCON	n/a		CMU	PT	EXP	EXP
Equipment Storage	SCON	n/a		CMU	PT	EXP	EXP
Tire Storage	SCON	n/a		CMU	PT	EXP	EXP
Service Bays	EPOXY	EPOXY	8	CMU	PT	EXP	EXP
Mech Rec/Manuals	LIN	LIN	6	GWB	PT	ACT	9'0"
Maint Foreperson	LIN	LIN	6	GWB	PT	ACT	9'0"
Parts Room	SCON	n/a		GWB	PT	ACT	9'0"
Elevator Machine Room	SCON	n/a		GWB	PT	EXP	EXP
(Elevator)	POR	POR	6	-	WD	WD	9'0"
Stair 2	SCON	n/a		CMU	PT	EXP	EXP
Operations Supv	CPTT	RUB	6	GWB	PT	ACT	9'0"
Dispatcher	LIN	LIN	6	GWB	PT	ACT	9'0"
Reception/Waiting	POR	POR	6	GWB	PT	ACT	9'0"
Ops Corridor	POR	POR	6	GWB	PT	ACT	9'0"
Ofc Support Equip Stor	LIN	LIN	6	GWB	PT	ACT	9'0"
Supervisor	CPTT	RUB	6	GWB	PT	ACT	9'0"
Break Room 1	LIN	LIN	6	GWB	PT	ACT	9'0"
Ops Report Room	LIN	LIN	6	GWB	PT	ACT	9'0"
Mens Room 1	POR	POR	FH	GWB	PT	GWB	9'0"
Womens Room 1	POR	POR	FH	GWB	PT	GWB	9'0"
Stair 1	SCON	n/a		CMU	PT	EXP	EXP
Farebox	LIN	LIN	6	GWB	PT	ACT	9'0"
Telephone	SCON	n/a		CMU	PT	ACT	9'0"
Electrical	SCON	n/a		CMU	PT	ACT	9'0"
Mechanical	SCON	n/a		CMU	PT	EXP	EXP
Maintenance Foyer	POR	POR	6	CMU	PT	ACT	9'0"
Ops Lockers	PCON	n/a		GWB	PT	ACT	9'0"
Lockers Corridor	PCON	n/a		GWB	PT	ACT	9'0"
Uniform Holding	PCON	n/a		GWB	PT	ACT	9'0"
Mens T/S/L	POR	POR	FH	GWB	PT	GWB	9'0"
Womens T/S/L	POR	POR	FH	GWB	PT	GWB	9'0"

<i>2nd Level</i>							
Admin Corridor	POR	POR	6	GWB	PT	ACT	9'0"
Break Room 2	LIN	LIN	6	GWB	PT	ACT	9'0"
Common Work Room	CPTT	RUB	6	GWB	PT	ACT	9'0"
Files Storage	LIN	LIN	6	GWB	PT	ACT	9'0"
Server/Telephone	LIN	LIN	6	GWB	PT	ACT	9'0"
Training 1	CPTT	RUB	6	GWB	PT	ACT	9'0"
Training Storage	CPTT	RUB	6	GWB	PT	ACT	9'0"
Training 2	CPTT	RUB	6	GWB	PT	ACT	9'0"
Directors Office	CPTT	RUB	6	GWB	PT	ACT	9'0"
Grants Coordinators Ofc	CPTT	RUB	6	GWB	PT	ACT	9'0"
Storage 2	LIN	LIN	6	GWB	PT	ACT	9'0"
Mens Room 2	POR	POR	FH	GWB	PT	GWB	9'0"
Womens Room 2	POR	POR	FH	GWB	PT	GWB	9'0"
Accountants Ofc	CPTT	RUB	6	GWB	PT	ACT	9'0"
Customer Specialist Svc	CPTT	RUB	6	GWB	PT	ACT	9'0"
Janitor	POR	POR	FH	GWB	PT	GWB	9'0"
Loggia (Exterior)	POR	POR	6	CMU	PT	GWB	9'0"
<i>Bus Wash</i>							
Bus Wash	SCON	n/a		CMU	PT	EXP	EXP

ABBREVIATIONS	
ACT	Acoustic Ceiling Tile
CMU	Concrete Masonry Unit
CPTT	Carpet Tile
EPOXY	Epoxy
EXP	Exposed
FH	Full-height
GWB	Gypsum Wall Board
LIN	Linoleum
LINT	Linoleum Tile
PCON	Polished Concrete
POR	Porcelain Tile
PT	Paint
RUB	Rubber
SCON	Sealed Concrete
WD	Wood

6.4 Structural

6.4.1 Administration Building

The two-story Administration Building will consist of a CMU shell on a concrete slab supported by engineered foundation piles. The sloped metal roof will be supported by pre-engineered metal trusses, with a top-of-beam height as indicated on the conceptual drawings (see Appendix A.) Acceptable floor framing systems to be comprised of bar joists or wide flange beams, supported on columns or load-bearing walls.

6.4.2 Bus Maintenance

The Bus Maintenance area will consist of a service bay area and support area, with overall approximate dimensions of 100 feet by 75 feet. The pile-supported foundation is shared with the Administration Building. CMU walls will project up to eight feet, with metal panel on metal framing walls above. Buses will enter the service bays through roll up doors. Roof structure shall be metal deck on pre-engineered metal framing. Walls are to be CMU up to eight feet; structure above can be either pre-engineered metal building or site-built traditional steel-framed. The top of beam height of the building above the service bays will be as indicated on the conceptual drawings (see Appendix A.)

6.4.3 Bus Wash

The Bus Wash building shall be built of CMU up to eight feet with metal panel on metal framing above, on a pile-supported foundation. The approximately 2,100 sf shell must accommodate a pre-manufactured bus-wash system. Interclean Equipment, Inc. Bus Wash (Two-Step Reclaim Water System) was used as the basis of design. Dimensions and additional requirements shall be coordinated with bus-wash system manufacturer prior to commencement of construction documents.

6.4.4 Fuel Island

The fuel island shall consist of above ground storage tanks for bio-diesel fuel, located so as to be easily accessible for refueling operations and fuel delivery. The concrete slab foundation will be supported by engineered piles, and will be curbed to provide containment in the event of a spill.

6.5 Mechanical

6.5.1 Bio-Diesel Storage and Feed Criteria

Aboveground bio-diesel storage tanks shall be double contained, protected type. Capacity shall be 8,000 gallons. The primary steel tank shall be rectangular in shape and have continuous welds on all exterior seams. The outer surface of the primary steel tank shall be covered by a minimum of 1.4 inch thick Styrofoam insulated panels.

The secondary containment shall consist of a 30 mil thick high density polyethylene membrane, enclosing the primary steel tank and insulation material. The containment shall be encased in six inches of monolithic reinforced concrete, with minimum design strength of 4,000 psi at 28 days. Tanks by Con Vault Florida, Inc. shall be the basis of design.

The associated above ground pump system shall be compact, direct drive cabinet pump. Pump shall be tank mounted and provided by the tank manufacturer. Pump motor shall be explosion-proof and UL listed. Provide one control panel for tank level output and pump operation.

A driveway for fuel delivery shall be provided and quick-connect piping shall be routed to the outside wall of the containment area, where trucks can pullout and unload fuel. Designer shall provide road curbage around fill area to ensure that tanker truck leakage does not extend past the fill area. Curbs shall be no more than 6 inches and no less than 3 inches and shall extend around the length of the longest tanker truck to enter the facility. A sump shall be provided to capture potential spills at the truck unloading area. The drain from the sump shall be lockable. For standing rainwater, the valve can be opened to drain to the storm sewer. For spills, the valve will be maintained in its locked position until clean-up is complete.

6.5.2 Service Bays Run-Off Treatment

Bus Maintenance Service Bays should have trench drains across entire entrance side and entire exit side of the floor, designed for easy grate removal and cleaning. Avoid elbows and turns. Allow for flushing and pigging on washdown drain lines. Oil/water separators shall be capable of handling the velocity of washdown flows. More than one oil/water separator may be required. Provide ease of location and cleaning by facility personnel. Trench drains discharge to the sanitary sewer system.

6.5.2.1 Sump Pumps.

Sump pumps shall be vertical wet-pit centrifugal pumps. All sump pumps provided for this project shall be by the same manufacturer. Design sumps and wet wells in accordance with the latest edition of the *Hydraulic Institute Standards*.

Unless otherwise indicated, pump materials for all sump pumps shall be resistant to leachate and similar to materials listed below:

Lineshaft:	Type 416 stainless steel
Lineshaft Bearings:	Ceramic
Head Shaft:	ASTM A276, Type 416 stainless steel
Impeller Shaft:	ASTM A276, Type 416 stainless steel
Shaft Sleeves:	ASTM A269, Type 304 stainless, steel hardened
Impeller:	Polypropylene
Bowl and Suction Case:	Ceramic
Bowl and Suction Case Bearings:	Ceramic
Discharge Head:	Thermoplastic
Shaft Seal:	V-ring Vapor Seal
Column:	Sch. 80 Kynar
Strainer:	Polypropylene
Motor Shaft:	Hollow
Anchor Bolts:	Stainless steel
Maximum Pump Speed:	1,760 rpm
Minimum Bearing Life:	100,000 hours

6.5.3 Heating, Ventilating, and Air Conditioning

6.5.3.1 General

- Cooling load and ventilation rates shall be determined following the codes and standards described in design standards included in Section 5.6, Building Mechanical Technical Requirements.
- The air conditioning system shall provide effective air circulation, temperature control, and humidity in the serviced areas.
- Mechanically ventilated spaces must meet the minimum requirements of Sections 4 through 7 of ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda;) naturally ventilated spaces must comply with ASHRAE Standard 62.1-2007, Paragraph 5.1 (with errata but without addenda.) See LEED Reference Guide, Indoor Environmental Quality Prerequisite 1, Minimum Indoor Air Quality Performance.
- Design HVAC systems in coordination with the building envelope to ensure right-sizing of equipment, and to meet or exceed the requirements of ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy (with errata but without addenda.) Provide permanent monitoring system to ensure that building performance

meets desired comfort criteria. Refer to LEED Reference Guide, Indoor Environmental Quality Credit 7.1 and 7.2, Thermal Comfort – Design, and Verification, respectively.

- All systems will be designed in coordination with the building envelope, electrical and other systems, to optimize energy performance, as defined in the LEED Reference Guide, to achieve energy cost savings of at least 30% (10% required by LEED Energy and Atmosphere Prerequisite 2, Minimum Energy Performance; 30% for EA Credit 1, Optimize Energy Performance.)
- Air conditioning equipment must be installed above flood line.
- The air conditioning units shall be sized for the internal (people, equipment, lights, etc.) and external load that impact the serviced spaces.
- Air conditioning units of 2000 cubic feet per minute (cfm) and greater shall be interlocked with smoke detectors located in the supply ductwork and shall shut down when smoke is detected.
- The air ventilation systems shall keep the areas at a temperature no higher than 104°Fdb.
- The heating, ventilation, and air conditioning (HVAC) systems shall provide positive pressurization of air conditioned buildings relative to the outside atmosphere at all times to minimize infiltration.
- The HVAC equipment operation schedule shall operate 24 hours per day, 7 days per week with provision for automatic night setback and manual override for night operations.
- A ventilation system shall provide effective circulation of air in the serviced areas.
- Coordinate with architect to ensure that exterior smoking areas are designated to be more than 25 feet from any building opening, including outdoor air intakes, as outlined in LEED Reference Guide, Indoor Environmental Quality Prerequisite 2, Environmental Tobacco Smoke (ETS) Control.
- Furnish fans that comply with AMCA-certified rating seal for both sound and air performance
- Provide outside air as per Florida Building Code, Mechanical. Provide permanent monitoring systems, in accordance with LEED Reference Guide, to ensure that ventilation systems maintain design minimum requirements, and to generate an alarm when airflow values or carbon dioxide (CO₂) levels vary by 10% or more from design values (see LEED Indoor Environmental Quality Credit 1, Outdoor Air Delivery Monitoring.)
- Provide equipment that will support high efficiency filtration media, MERV13 or higher, for both return and outside air that is delivered as supply air. Refer to LEED Reference Guide, Indoor Environmental Quality Credit 5, Indoor Chemical and Pollutant Source Control.
- The Energy Efficiency Ratio of the Air Cooling Equipment shall be equal or greater than described by Florida Building Code, Chapter 13.

6.5.3.2 Air Conditioning Systems

Constant Volume Single Zone Air Handling Unit(s)

- The air handling units (AHUs) shall be Direct Expansion (DX) type, which include an evaporator coil, refrigeration and temperature controls, filters and a centrifugal fan. A dedicated condensing unit shall consist of condenser fans, a compressor, and a condenser coil. Condenser coils shall be provided with a seacoast environment protection coating, Technicoat or equal.
- The AHU shall recirculate the conditioned air to the spaces with constant fresh outside air make up during occupied hours.
- Refrigerants shall not be chlorofluorocarbon (CFC)-based, as per LEED Energy and Atmosphere Prerequisite 3, Fundamental Refrigerant Management. Where feasible, select refrigerants and equipment that minimizes or eliminates the emission of compounds that contribute to ozone depletion. Base building HVAC&R equipment shall comply with the formula for the maximum threshold for combined contributions to ozone depletion as found in the LEED Reference Guide, Energy and Atmosphere Credit 4, Enhanced Refrigerant Management.
- For areas with odorous air, replaceable, impregnated carbon filters with post filters shall be used for removing odors.
- The AHU's filtration section shall consist of a 35 and 60 percent dust spot efficiency filters (minimum).
- Metal ductwork shall distribute and return the air from and to the AHU.
- Select diffusers and grilles on basis of throw and noise criteria considerations. Material shall be aluminum due to corrosive salt environment.
- Thermostats shall be installed in representative temperature location in the cooling zone, with individual controls for a minimum of 50% of the regularly occupied spaces, and in all shared multi-occupant spaces (see LEED Reference Guide Indoor Environmental Quality Credit 6.2, Controllability of Systems - Thermal Comfort.) Thermostats shall be 7-day programmable.

6.5.3.3 Mechanical Ventilation Systems

Exhaust Fans

- The exhaust system shall consist of a centrifugal exhaust fan and its respective ductwork air collection system.
- Bathroom exhaust fans may be direct drive and mounted above the ceiling.
- Each centrifugal exhaust fan shall be a belt driven type, with housing, fan wheel, fan shaft, bearing motor, and disconnect switch drive assembly, curb base, and accessories.
- In spaces where hazardous gases or chemicals may be present or used (i.e. Service Bays, Lubricant Storage, Battery Room, Electronics Shop, Compressor, Janitor,) sufficiently exhaust each space to create negative pressure with respect to adjacent spaces when the doors to the room are closed, with an exhaust rate of at least 0.50 cfm/sf with no air recirculation. Refer to LEED Reference Guide, Indoor Environmental Quality Credit 5, Indoor Chemical and Pollutant Source Control.
- Fan construction (housing and blades) shall be of corrosion-resistant materials.
- Exhaust grilles and duct material shall be resistant to the corrosive effects of the fumes.
- Roof mounted fans must be installed to withstand 150 mph winds. Provide details showing fastening system(s).
- Roof access and service platforms shall be provided to satisfy the Florida Building Code.

Centrifugal Supply (Make-Up) Fans

- The supply system shall consist of a roof-mounted fan, or ground mounted above the flood plain, and its respective ductwork air distribution system.
- Each supply fan shall be belt-driven type, with housing, fan wheel, fan shaft, vibration isolation supports, bearing motor, and disconnect switch drive assembly, mounting base, and accessories.
- Fan construction (housing and blades) shall be of corrosion-resistant materials.
- Supply fan units shall be interlocked with the respective exhaust fan units.
- The supply fan units shall use 100 percent outside air.
- Unit shall be installed above the flood line.

6.5.3.4 Buildings

Areas to be Air Conditioned

Administration Building: Shall be air conditioned at 75°F db and 50 percent Relative Humidity.

Administration Building

Constant Volume Single Zone Air Handling Unit(s)

Ventilation System

Supply and Exhaust Fans shall be designed to prevent area temperatures from exceeding 104°F based on ambient design conditions for Key West, Florida.

Areas to be Ventilated

- Lubricant Storage, Non-hazardous Storage, Compressor, Tire Storage, Electronics Shop, Equipment Storage: Ventilate the area with exhaust fans that are interlocked with supply fans. The area shall be continuously ventilated, with minimum ventilation rate of 0.50 cfm/sf. Exhaust air shall be directed up and away from the building at a minimum rate of approximately 2000 feet per minute. Supply air shall be directed towards the exhaust system to maintain an equal and adequate flow across the entire work area. Ventilation rates should be able to maintain area temperatures of 104 °F or less. Winter ventilation rates may be reduced.
- Service Bays, Battery Room, Machine Shop: The minimum ventilation rate for this area shall be 2 cfm/sf. Ventilation shall be continuous unless the system is automated to detect carbon monoxide at 25 ppm. Provide a vehicle exhaust system in service bays. Provide a designated exhaust system for welding station (in Machine Shop.) Provide an exhaust system design that effectively removes carbon monoxide from all work areas.
- Janitor's Room: The minimum ventilation rate for this area shall be 1.5 cfm/square foot.
- Rest Rooms shall be exhausted at 50 CFM per fixture per Florida Mechanical Code.

Bus Maintenance Area

Centrifugal Supply (make-up) Fans and Exhaust Fans

Bus Wash

Centrifugal Supply (make-up) Fans and Exhaust Fans

6.5.4 Plumbing

6.5.4.1 General

- The plumbing system shall provide sewer and potable water services for the facility.
- Storm drainage services shall be provided.
- Backflow preventer devices shall be installed to water branches serving the Administration Building, Bus Maintenance area, Bus Wash and fire protection equipment.
- The potable water and fire protection pipe lines shall be identified with a color coded system.
- Toilet Rooms, Locker Rooms and Shower rooms shall be supplied with floors drains.
- The Machine Shop and Service Bays are to be supplied with floor drains and oil/water separator(s).
- Bus Wash drainage shall be as per bus-wash system manufacturer's recommendations.
- Plumbing systems shall be designed to contribute to a reduction in water usage, as defined in the LEED Reference Guide, of at least 40% (20% required by Water Efficiency Prerequisite 1, Water Use Reduction; 40% for WE Credit 3, Water Use Reduction.) Utilize only low-flow/high-efficiency fixtures including toilets, urinals, lavatory faucets, showers, kitchen sink faucets, and pre-rinse spray valves; consider use of automatic sensors, metering controls, and alternative faucet operators.

6.5.4.2 Plumbing Services

- Potable cold water
- Potable hot water
- Storm drainage services include, but are not limited to, gutters and rain leaders
- Sewage drainage services include, but are not limited to, floor drains, oil/water separators
- Bus wash system supply and related appurtenances to be coordinated with bus wash system manufacturer prior to commencement of construction documents.
- Rainwater harvesting system
- Compressed air conveyance

6.5.4.3 Buildings

Administration Building and Bus Maintenance Area

Provide plumbing services to the following areas:

- **Break Rooms:**
 - *Break Room Sink:* Stainless steel double sink with gooseneck fittings, attached sprayer, cold and hot water, and drainage services shall be provided
 - *Ice Machine:* Cold water line and drainage services shall be provided

- **Rest Rooms:**
 - *Lavatories and Showers:* Shall be provided with cold and hot water and sewage drainage services
 - *Toilet:* Shall be provided with cold water and sanitary services, no more than .6 gpf
 - *Urinal:* Shall be provided with cold water and sanitary services, no more than .25 gpf
- **Janitor and Mechanical Rooms:**
 - *Janitor Sink:* Mop sink shall be provided; cold and hot water and sanitary drainage services
- **Service Bays:**
 - *Trench Drains:* Provide a perimeter trench drain system with heavy traffic-rated metal grating cover; drainage from this area shall pass first through an oil/ water separator prior to discharge
 - *Hose Bibs:* Provide hose bibs with atmospheric vacuum breakers for area wash down
 - *Oil/Water Separator:* Provide oil/water separator for service bays
 - *Compressed Air Services Drops:* Shall be provided with quick connect fixtures
- **Machine Shop Area:**
 - *Hose Bibs:* Provide hose bibs for area wash down
 - *Machine Shop Sink:* A service sink shall be provided for hand washing
 - *Compressed Air Services Drops:* Shall be provided with quick connect fixtures

Bus Wash

Provide plumbing services to the bus wash building as required by bus-wash system manufacturer, including but not limited to, cold water, drainage service, oil/water separator.

6.5.5 Fire Protection

6.5.5.1 Administration Building

The Administration Building shall be protected throughout with a fully automatic wet pipe sprinkler system. Appropriate backflow prevention shall be provided. System flow alarm and tamper switches shall be connected to fire alarm system. Sprinkler heads shall be recessed type, quick response bulb-type, with chrome finish.

Appropriate type portable fire extinguishers shall be located in cabinets at each building exit and additional extinguishers provided to limit travel distance to maximum allowed by NFPA 10.

6.5.5.2 Bus Maintenance Area

The Bus Maintenance Area shall be protected throughout with a fully automatic, deluge type, wet pipe sprinkler system. Appropriate backflow prevention shall be provided. System flow alarm and tamper switches shall be connected to fire alarm system.

Appropriate type portable fire extinguishers shall be located in cabinets at each building exit and additional extinguishers provided to limit travel distance to maximum allowed by NFPA 10.

6.5.5.3 Bus Wash

Fire protection in the Bus Wash Building shall be as determined by the local Authority Having Jurisdiction.

6.5.5.4 Fuel Island

Fuel dispensing systems shall be provided with one or more clearly identified emergency shut-off devices or electrical disconnects, installed in an approved location not less than 20 feet nor more than 100 feet from the dispensing devices they serve. These devices shall comply with NFPA 101 and NFPA 30A. Two (2) large fire extinguishers - Classes ABC - shall be mounted within the vicinity of the island. Additional fire protection shall be provided where required by the Authority Having Jurisdiction.

6.6 Electrical

6.6.1 Introduction

This section defines the requirements of the Key West Public Transportation Facility electrical distribution system. In addition to the requirements presented herein, the electrical distribution system shall be designed and installed in accordance with the Electrical Technical Requirements, Section 5.7.

All systems will be designed in coordination with the building envelope, HVAC and other systems, to optimize energy performance, as defined in the LEED Reference Guide, to achieve energy cost savings of at least 30% (10% required by LEED Energy and Atmosphere Prerequisite 2, Minimum Energy Performance; 30% for EA Credit 1, Optimize Energy Performance.)

6.6.2 Power Distribution

The major components of power distribution include:

- 480V Switchboard/Motor Control Center
- 480V Bio-Diesel Engine Generator

A brief description of the electrical loads follows:

1. Administration Building
2. Bus Maintenance, Shops and Storage Area
3. Bus Wash
4. Fuel Island
5. Site Lighting
6. Elevator
HVAC

6.6.3 Summary of Operation of the Electrical Distribution System

The electrical distribution system is designed such that a failure in a single piece of equipment will not adversely affect normal operations. The 480 V Switchboard/Motor Control Center will provide the interlocks necessary to start the bio-diesel engine generator when normal utility power is not available. Paralleling operations of the generator with the utility is not required.

6.6.4 Bio-Diesel Engine Generator Sizing

A bio-diesel engine generator shall be provided. The actual size of the generator is to be determined by the Design/Builder, based on a three-day whole-facility capability. The following are the minimum loads and starting sequence that shall be used in determining the size of the generator:

- A. Sequential Power Panels and Lighting Panels.
- B. Fuel dispensing

The starters, types, sizes, and voltage ratings shall be determined by the Design/Builder. The starter type, size, and voltage ratings shall meet the requirements of the Electrical Technical Requirements.

6.6.5 Motor Starter Control Logic

Motor logic shall be designed to meet the facility requirements.

6.6.6 Lighting

As recommended in the LEED Reference Guide, Sustainable Sites Credit 8, Light Pollution Reduction, interior lighting should be designed to minimize light trespass from the building, and exterior lighting power densities should not exceed ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) for the classified zone as defined in IESNA RP-33.2009 Edition.

Lighting system controls shall be provided in all shared multi-occupant spaces, and individual lighting controls shall be provided for as many workstations as possible (90% minimum of building occupants is the goal for achieving LEED Indoor Environmental Quality Credit 6.1, Controllability of Systems - Lighting.)

- Recommended foot-candle levels are provided in Section 5.7.4
- Lay-in fluorescent fixtures are suggested in the Training Rooms, Common Work Room, Break Rooms and Offices.
- The lighting design should offer task lighting at a high foot candle level at every individual work station, and in all shared, multi-occupant spaces.
- Sealed wet area fixtures are to be used in the Locker Room suite. Each shower is to have a light fixture over it.
- The lighting design should offer task lighting at a high foot candle level at every lavatory.
- In the Administration Building, Design/Builder to supply and install under cabinet fluorescent fixtures at all upper cabinet locations.
- The Machine Shop will require general high efficiency illumination, but task lighting at a higher foot-candle level shall be provided over the workbench areas of that space. This space will be exposed to the outside humidity and salt environment through open doors and ventilation.
- The Service Bays will require general high efficiency illumination, and pull-down task lighting at a higher foot-candle level shall be provided. This space will be exposed to the outside humidity and salt environment through open doors and ventilation.
- The Parts Room will require general illumination and task lighting over the desk location.
- The Bus Wash Building will require high efficiency, ceiling mounted, moisture resistant lighting of appropriate materials for a salt environment, since this space will be open to the air much of the day. Specific lighting and electrical requirements shall be coordinated with automated bus-wash system manufacturer.